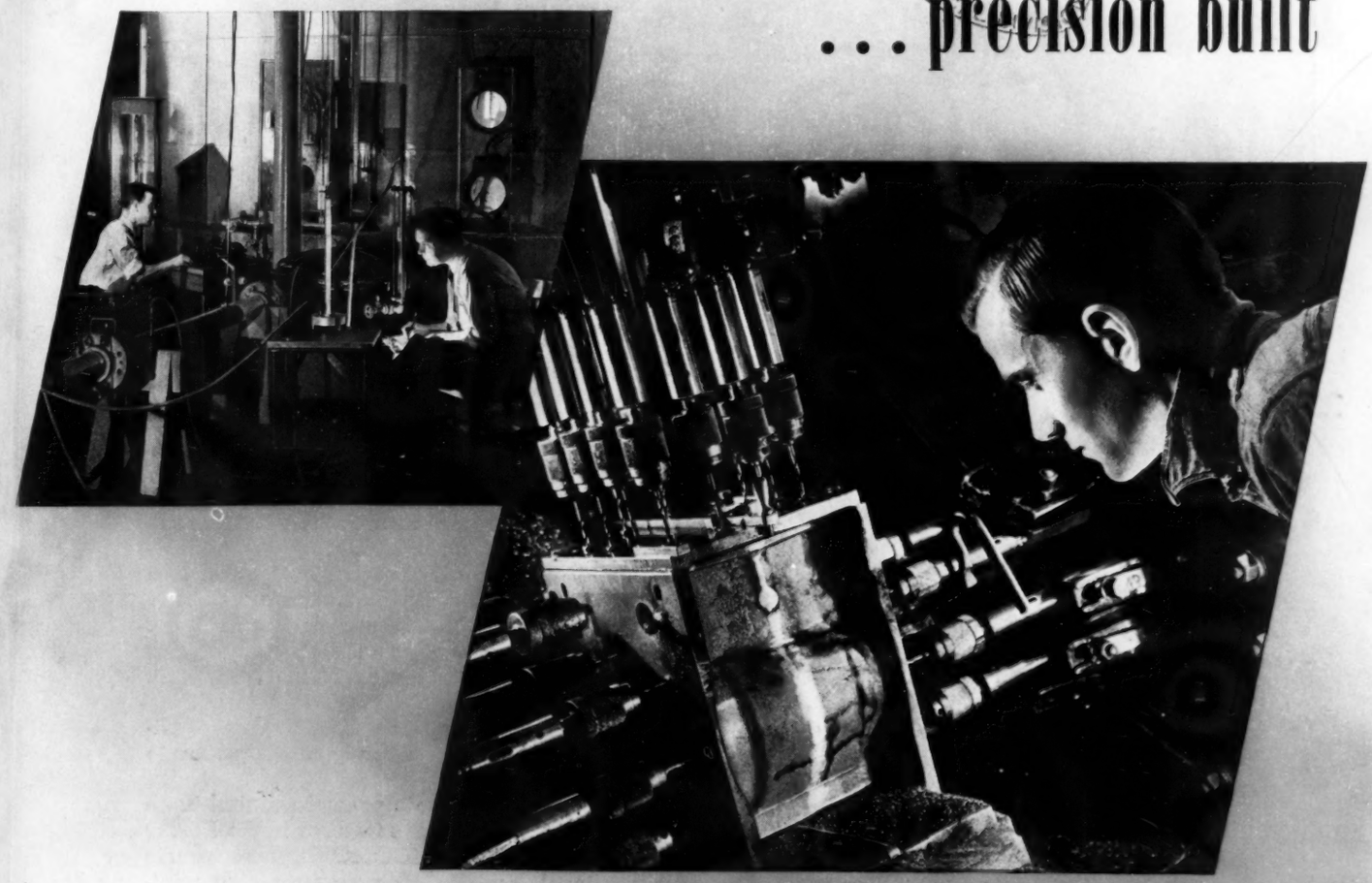
GAS

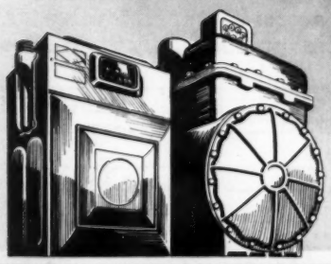
ENGINEERING • UTILIZATION • LOAD-BUILDING • MANAGEMENT

10387

LIBRARY OF CONGRESS
1939
PERIODICAL

Laboratory controlled ... precision built





GENERAL OFFICES • 60 EAST 42ND STREET, NEW YORK, N. Y.

AMERICAN METER COMPANY

INCORPORATED (ESTABLISHED 1836)

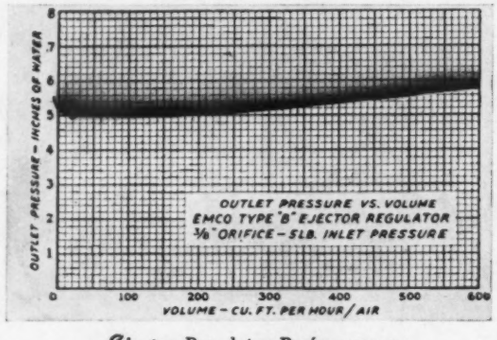
SEPTEMBER 1939 ◆ ◆ 25 CENTS

CURVE CONSCIOUS

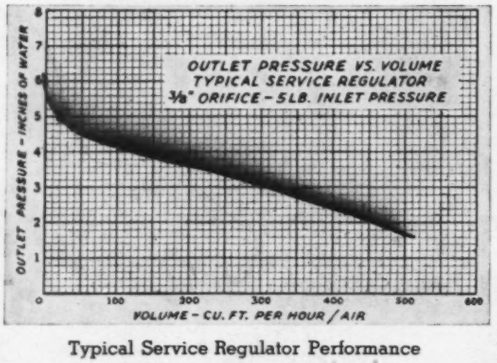
YOU WILL APPRECIATE THE *Ejector* PRINCIPLE IN EMCO SERVICE REGULATORS

EMCO Type "B" *Ejector* Regulator cut-away section showing flow stream induced by ejector principle.

COMPARATIVE PERFORMANCE CURVES


OUTLET PRESSURE - INCHES OF WATER
OUTLET PRESSURE VS. VOLUME
EMCO TYPE "B" EJECTOR REGULATOR
⅜" ORIFICE - 5 LB. INLET PRESSURE
VOLUME - CU. FT. PER HOUR / AIR

Ejector Regulator Performance


OUTLET PRESSURE - INCHES OF WATER
OUTLET PRESSURE VS. VOLUME
TYPICAL SERVICE REGULATOR
⅜" ORIFICE - 5 LB. INLET PRESSURE
VOLUME - CU. FT. PER HOUR / AIR

Typical Service Regulator Performance

Curves—the mathematical kind—are the best expression of true ability of equipment. To really understand the benefits to be derived from the EMCO *Ejector* principle, the curves at the left, showing comparative regulator performance, should be studied.

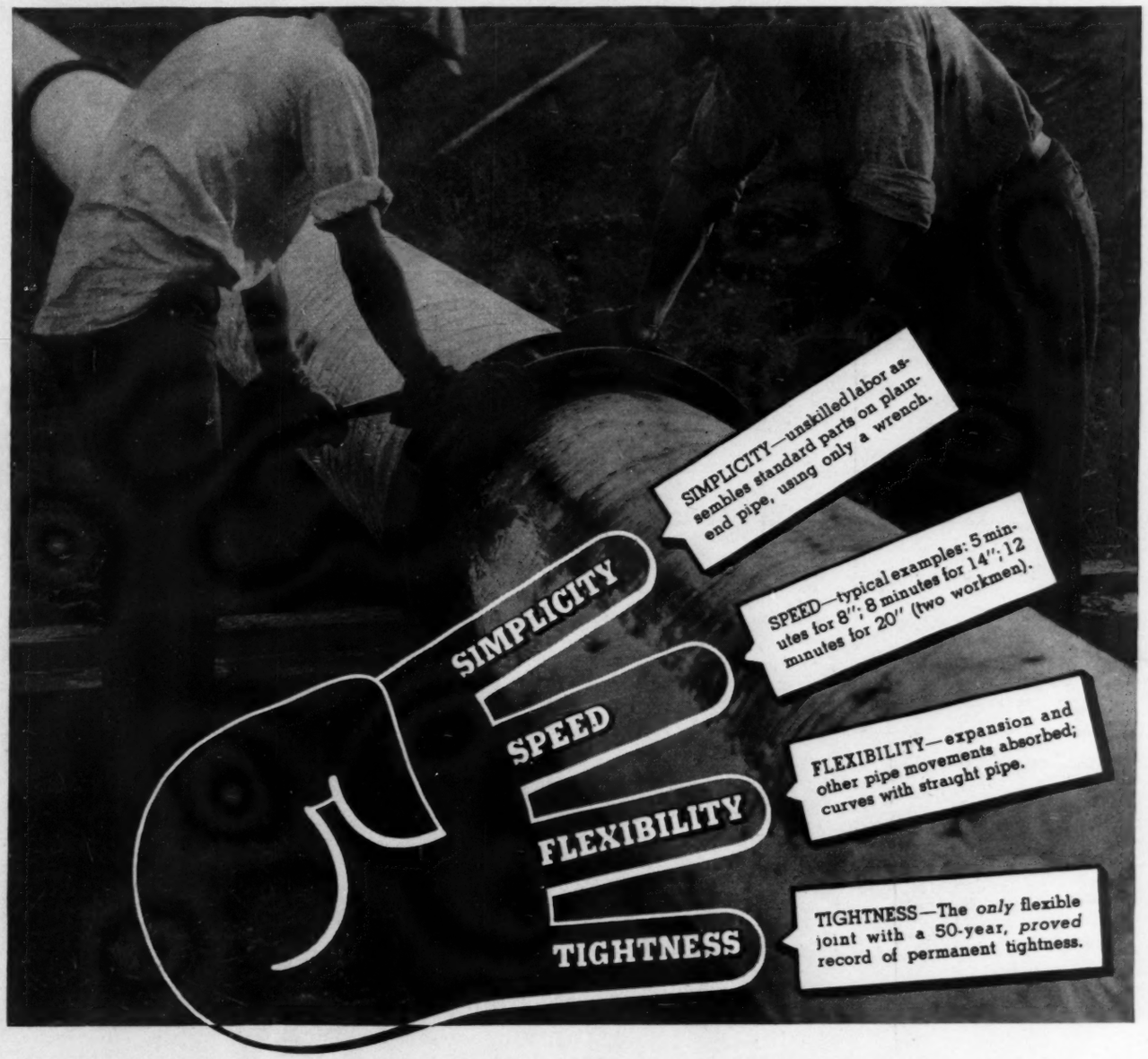
Note the *Ejector* curve shows that with increasing demand by the consumer, the pressure automatically increases. This insures that fuel line pressure loss and meter absorption can not rob the house system of its proper operating pressure. Contrast this desirable curve with the drooping performance line obtained from the typical service regulator.

Satisfactory performance from modern appliances depends increasingly upon accurate pressure control.

In addition to accurate pressure control there are many other desirable features in the EMCO *Ejector* design. The EMCOMOLD valve insures a continual low shut-off pressure which minimizes high pressure troubles and blowing seals. Easy accessibility of this valve is a feature which will be appreciated by the service man.

PITTSBURGH EQUITABLE METER COMPANY
MERCO NORDSTROM VALVE CO.
NEW YORK · BUFFALO · PHILADELPHIA · KANSAS CITY · TULSA · LOS ANGELES
Main Offices · PITTSBURGH, PA.
DES MOINES · CHICAGO · COLUMBIA · MEMPHIS · OAKLAND · HOUSTON

CHECK ALL FOUR!


SIMPLICITY—unskilled labor assembles standard parts on plain-end pipe, using only a wrench.
SPEED—typical examples: 5 minutes for 8″; 8 minutes for 14″; 12 minutes for 20″ (two workmen).
FLEXIBILITY—expansion and other pipe movements absorbed; curves with straight pipe.
TIGHTNESS—The *only* flexible joint with a 50-year, *proved* record of permanent tightness.
SIMPLICITY
SPEED
FLEXIBILITY
TIGHTNESS

Before you decide on any pipe joint, check it for "ALL FOUR"—*Simplicity, Speed, Flexibility,* and *Tightness.* The builder of this 230-mile, 22″ natural-gas line from Indiana to Michigan got ALL FOUR because he specified Dressers. • There is no "short cut" to *true* pipe-joint economy. Insist on ALL FOUR. *Only Dressers Give You ALL FOUR!*

DRESSER MANUFACTURING CO., BRADFORD, PA. Offices at New York, Chicago, Houston, and San Francisco. In Canada: Dresser Mfg. Co., Ltd., 60 Front Street, W., Toronto, Ont.

FITTINGS?—We make a complete line of Long, Cast, Reducing, and Insulating Couplings; also steel and malleable ells, tees, crosses, etc. Write for our General Catalog Number 36.

DRESSER
PIPE COUPLINGS

Advertisers

American Brass Co. 80
American Cast Iron Pipe Co. 78
American Meter Co. Front Cover
Art Concrete Works 70

The Barber Gas Burner Co. 82
H. R. Basford Co. 76
The Blackstone Hotel 80
Blaw-Knox Co. 11
Bundy Tubing Co. ..
Butane-Propane News 66

Carbide and Carbon Chemicals Corp. 8
Cast Iron Pipe Research Association 9
The Chaplin-Fulton Manufacturing Co. 64
Chicago Vitreous Enamel Product Co. ..
The Cleveland Trencher Co. 81
Coast Counties Gas and Electric Co. 70
Condensation Engineering Corp. 53
Connelly Iron Sponge & Governor Co. ..
The Cooper-Bessemer Corp. 4
Crane Co. 13
Cribben & Sexton Co. 16

Detroit-Michigan Stove Co. 45
Dresser Manufacturing Co. 1

Ensign Carburetor Co., Ltd. 68

Fisher Governor Co. ..
Fraser Furnace Co. 76

General Controls 58
General Gas Light Co. ..
James Graham Manufacturing Co. 55
Greenlee Tool Co. 77

Handbook Butane-Propane Gases, Second Edition 60
Howle Co. 53

Johns-Manville 47, 79
Johnson Gas Appliance Co. 72

Kitson Co. 77

P. M. Lattner Manufacturing Co. 74

Merco Nordstrom Valve Co. 49, 50
Milwaukee Gas Specialty Co. 74
Minneapolis-Honeywell Regulator Co. 67
L. J. Mueller Furnace Co. 69
Mueller Co. Third Cover

The National Supply Co. 3
National Tube Co. 12

Pacific Coast Gas Association, Inc. 73
Pacific Gas and Electric Co. 6, 7
Pacific Gas Radiator Co. 69
Pacific Meter Works Front Cover
Payne Furnace & Supply Co. 57
Philgas Dept., Phillips Petroleum Co. ..
Pittsburg Water Heater Corp. 61
Pittsburgh Equitable Meter Co. Second Cover

Reliance Regulator Corp. 15
Republic Heaters Sales Co. ..
Republic Steel Corp. ..
Reynolds Gas Regulator Co. 75
Robertshaw Thermostat Co. 43
George D. Roper Corp. ..

San Diego Consolidated Gas & Electric Co. 71
Semet-Solvay Engineering Corp. 18
Servel, Inc., Electrolux Sales Division 59
Sharples Solvents Corp. 5
M. B. Skinner Co. ..
Southern California Gas Co. 14
Southern Counties Gas Co. 14
Spencer Thermostat Co. 78
The Sprague Meter Co. Fourth Cover
Standard Oil Co. of California 81

U. S. Pipe & Foundry Co. 10
United States Steel 12

The Vent-A-Hood Co. 76

Ward Heater Co., Ltd. 62
Webster Engineering Co. ..
Welsbach Co. 79
Worthington Pump & Machinery Corp. ..

John Zink Burner Co. 65

GAS

Fifteenth Year of Publication

Contents for September, 1939

GUEST EDITORIAL: Bridging the Gap . . . . *By H. L. Farrar* 17

Thermally Thinking 19

The Partial Dehydration of High Pressure Natural Gas *By B. M. Laulhere and C. F. Briscoe* 21

GAS on Parade 25

A Voyage to Treasure Island 27

Mansion or Cottage — They're Both All-Gas in Houston *By W. H. Tipton* 30

ABSTRACTS BY THE STAFF:

Current and Voltage Needs for the Cathodic Protection of Steel Submarine Pipe Lines . . . . . *By H. J. Keeling* 31

Natural Gas in California — Its Supply and Production from 1906 to 1939 . . . . . *By Roy M. Bauer* 33

Operating Costs of Gas-Fired Air Conditioning Systems *By J. A. Hill* 35

Control of Cooling Tower Algae with Chlorine Gas *By T. C. Wallace* 37

The Separation of Dust by Centrifugal Force . . *By Frank Wills* 38

Lowering the Decomposition Temperature of Hydrates *By J. S. Powell* 39

Yes, There Is a Commercial Water Heating Market *By W. S. Walker* 41

Sales Slants 46

Parallel-Connected Thermocouples for the Testing of Gas Appliances *By Walter B. Kirk and George J. Pacanovsky* 51

The Woman's Viewpoint 52

Industry Personalities 64

Current Reading 72

Modern Products 80

Publication Office: **LOS ANGELES, 810 South Spring Street, MIchigan 1481.** ***Branches:*** **NEW YORK, 489 Fifth Avenue, MUrray Hill 2-4285. DALLAS, 6015 Morningside Avenue. Phone 8-6309; CHICAGO, 1064 Peoples Gas Building, HARrison 6634.**

September, 1939. Volume XV, Number 9. *GAS* is published monthly by Western Business Papers, Inc., at 810 South Spring Street, Los Angeles, California. **JAY JENKINS**, President and General Manager; **CRAIG ESPY**, Vice-President; **GEORGE H. FINLEY**, Vice-President; **JAMES E. JENKINS**, Secretary-Treasurer; **ARTHUR ROHMAN**, Managing Editor; **WILLIAM C. COPP**, Eastern Manager; **W. G. RUSSELL**, Field Representative. Subscription price United States, Canada, Mexico and Central American countries (in advance), 25 cents the copy, three years for $2.00, $1.00 per year; all other countries, $3.00 per year. Entered as second class matter August 20, 1936, at the post office at Los Angeles, Calif., under the Act of March 3, 1879. Copyright, 1939.

Official Publication: Pacific Coast Gas Association. *Member:* Audit Bureau of Circulations; Associated Business Papers, Inc. *Publishers:* OIL & GAS *Equipment Review;* BUTANE-PROPANE *News;* HANDBOOK BUTANE-PROPANE GASES.

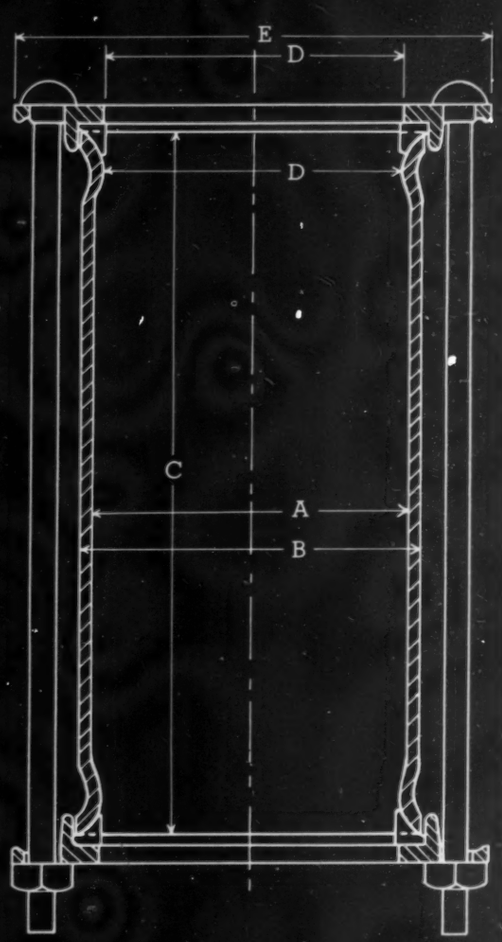
Dayton LONG SLEEVE COUPLINGS

DAYTON No. 5 LONG COUPLING

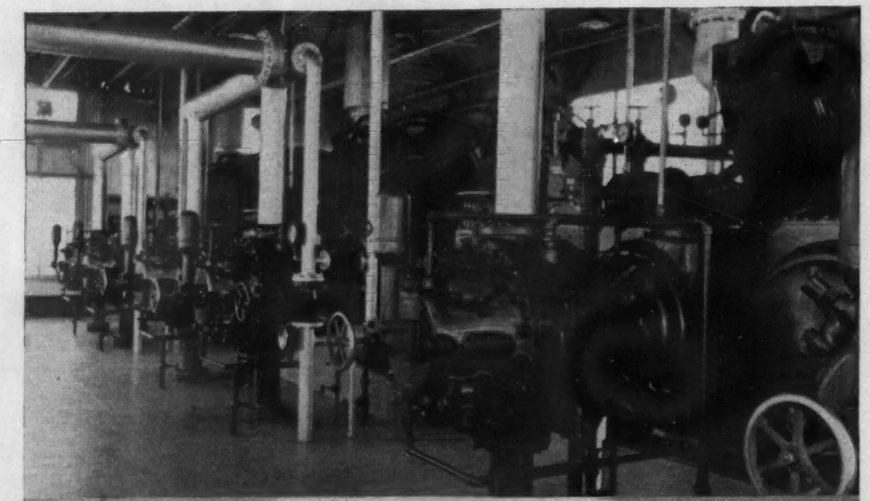
I.D.	O.D.	WT.	A	B	C	D	E	BOLTS NO.	BOLTS SIZE	Flange
.50	.840	3	.920	1.188	9	.91	3.375	2	.375 x 10.5	
.75	1.05	3½	1.127	1.378	13	1.12	3.875	2	.5 x 11	
1.0	1.315	5¾	1.392	1.688	13	1.385	4.062	2	.5 x 14.5	
1.25	1.66	7	1.75	2.063	13	1.730	4.5	2	.5 x 14.5	
1.5	1.9	7½	1.977	2.313	13	1.97	4.812	2	.5 x 14.5	
2.0	2.375	11½	2.453	2.813	13	2.445	5.812	2	.625 x 15	
2.0	2.375	13	2.453	2.813	13	2.445	5.812	3	.625 x 15	
2.5	2.875	18	3.099	3.563	13	2.945	6.312	3	.625 x 15	
2.75	3.0	18	3.099	3.563	13	3.07	6.375	3	.625 x 15	
3.0	3.5	22¼	3.604	4.063	13	3.57	7.187	4	.625 x 15	MALLEABLE
3.5	4.0	23½	4.104	4.563	13	4.07	7.687	4	.625 x 15	
4.0	4.5	30	4.604	5.079	13	4.57	8.687	4	.625 x 15	
4.5	5.0	27½	5.594	6.0	16	5.07	8.5	4	.625 x 19	
5.0	5.25	29¼	5.594	6.0	16	5.32	8.875	4	.625 x 19	
5.0	5.5	29¾	6.219	6.625	16	5.636		4	.625 x 19	
5.0	5.563	29¾	6.219	6.625	16	5.636		4	.625 x 19	
5.625	6.0	31½	6.219	6.625	16	6.062	9.625	4	.625 x 19	Steel
6.0	6.625	50	7.125	7.625	16	6.687	10.5	6	.625 x 19	"
6.625	7.0	51½	7.125	7.625	16	7.062	10.62	6	.625 x 19	"
7.625	8.0	43½	8.189	8.625	16	8.062	11.69	6	.625 x 19	"
8.0	8.625	72½	8.937	9.625	16	8.687	12.62	6	.625 x 19	"
8.625	9.0	72	9.375	10.0	16	9.062	13.43	6	.625 x 19	Mal.
9.625	10.0	76	10.192	10.75	16	10.062	14.13	8	.625 x 19	Steel
10.0	10.750	93	11.375	12.00	16	10.812	14.8	8	.625 x 19	"
11.625	12.00	105	12.09	12.75	16	12.062	16.19	8	.625 x 19	"
12.00	12.75	117	13.125	14.0	16	12.812	16.93	8	.625 x 19	"
12.5	13.0	117	13.125	14.0	16	13.062	17.19	8	.625 x 19	"
	13.5	124	14.25	15.0	18	13.562	18.75	10	.625 x 21	Mal.
	13.25	125	14.25	15.0	16	13.312	17.75	10	.625 x 19	Mal.
	14.	126	14.25	15.0	16	14.093	18.19	10	.625 x 19	
	15.	135	15.25	16.0	16	15.093		10	.625 x 19	
	16.	142	17.25	18.0	16	16.093	20.25	10	.625 x 19	
	18.	171	19.25	20.0	16	18.093	22.37	10	.625 x 19	
	20.	233	21.0	22.0	16	20.093	24.37	12	.625 x 19	
	20.	188	21.25	22.0	16	20.093	24.37	12	.625 x 19	STEEL
	22.	212	23.25	24.0	16	22.093	26.44	14	.625 x 19	
	22.	268	23.0	24.0	16	22.093	26.44	14	.625 x 19	
	24.	233	25.25	26.0	16	24.093	28.44	14	.625 x 19	
	24.	288	25.0	26.0	16	24.093	28.44	14	.625 x 19	

THE Dayton No. 5 Long Sleeve Coupling illustrated, is designed and built for repairing broken steel lines where a section of pipe must be removed. Also recommended for installation where excessive expansion and contraction is encountered.

Center Ring is of Seamless Steel with Flanges of Malleable or Steel as shown in the table at the left.

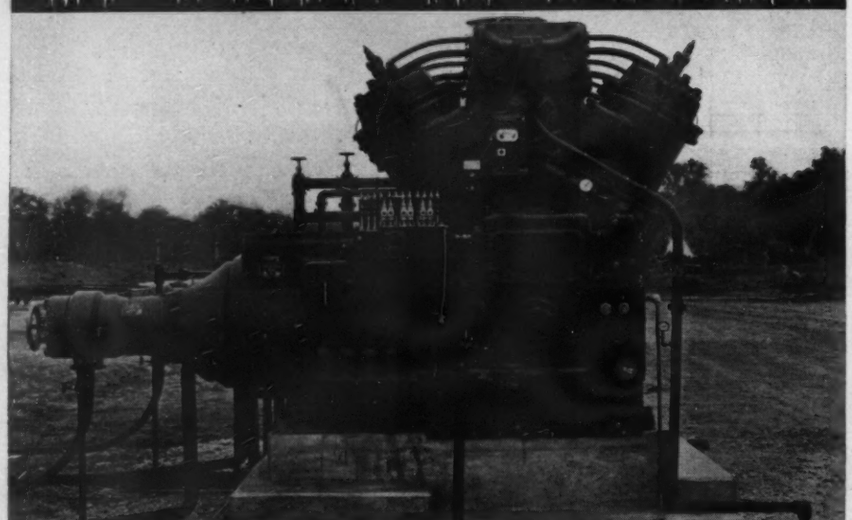


THE NATIONAL SUPPLY COMPANY
DAYTON COUPLING DIVISION
TOLEDO, OHIO



Turner Valley, Alberta, Canada . . . Three Type G-MV, 6-cylinder compressor units

51° BELOW IN CANADA



Texas . . . First of six Type G-MV Compressors for the largest re-pressuring project in the U. S. A.

100° ABOVE IN TEXAS

Frigid cold or blistering heat . . . temperature changes mean nothing to these dependable compressors!

Up in Turner Valley, where the temperature drops from 38° above to 26° below in two short hours, Royalite Oil Company supplies gas to their users with Type G-MV's . . . even when it skids to 51° below! Down in Texas, where old Sol takes heavy toll of men and machines . . . where temperatures rise to 110° in the shade . . . Type G-MV's go right on working. They are designed for continuous service under such conditions!

Here are compressors built to stand the gaff. Available in 400, 600 and 800-hp sizes, they are compact and powerful, economical and able . . . able to take the grind of tough service and keep going!

TYPE G-MV's KEEP GOING!

THE COOPER-BESSEMER CORPORATION

640 EAST 61st STREET . . . LOS ANGELES, CALIFORNIA

25 West 43rd Street, New York City — Mills Building, Washington, D. C. — 631 Spring St., Shreveport, Louisiana — 201 East 1st St., Tulsa, Oklahoma
Magnolia Building, Dallas, Texas — 529 M & M Building, Houston, Texas

Mount Vernon, Ohio — PLANTS — Grove City, Pennsylvania

THE *Pentalarm* PARADE

1930 — HIGH ODOR VALUE OF AMYL MERCAPTAN ESTABLISHED

1931 — **PENTALARM**
THE WARNING ODOR FOR FUEL GASES BECOMES AVAILABLE....

1932

1933 — NON-RETURNABLE CONTAINERS.... SMALLER VOLUME OF PENTALARM TO BE HANDLED

1934 — BY-PASS ODORIZATION DEVELOPED

1935 — LOWERED PRICES

1936 — BY-PASS ODORIZATION PERFECTED

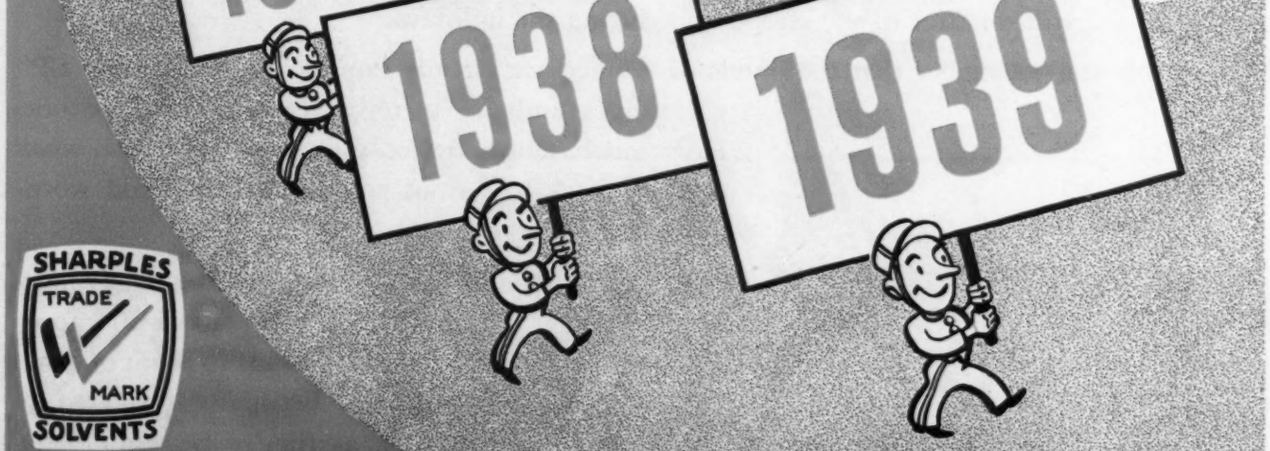
1937

PENTALARM assures adequate, safe odorization at a cost of less than 1/10 of a cent per 1000 cu. ft. of gas. Two 55-gallon drums will odorize 1 billion cu. ft. It can be introduced into main and pipelines by the use of simple, inexpensive equipment made up in your own shops. Its powerful odor—escaping with the gas from a leak—is far-reaching and unmistakable, assuring prompt alarm and immediate action!

COLORIMETRIC METHOD FOR MEASUREMENT OF ODORANT CONTENT IN GAS

1938

1939



SHARPLES TRADE MARK SOLVENTS

THE SHARPLES SOLVENTS CORP.
PHILADELPHIA CHICAGO NEW YORK

and back to work WE go...

getting ready for the sharp upswing in gas appliance sales which always comes in the fall. Remember that when leaves begin to fall and there's a touch of chill in the air, homelife moves indoors. We start entertaining again, which means extra dishes and more table linen to wash. There's little Jimmy's school clothes to be kept fresh and clean — to say nothing of little Jimmy himself. There are muddy floors to be scrubbed and cars to be washed and cold hands and feet to be thawed out. And later in the season everybody wants the bath water to be just a little warmer and that taxes further the capacity of the water heater.

The point is obvious. If the water heater is not satisfactory, that fact is going to be most noticeable during the fall and winter when hot water requirements are the heaviest. Therefore the fall is the logical time for dealers to push automatic gas water heaters.

The same thing is true of the kitchen range. Already we can see hot dishes replacing the summer salad and an increase in party cooking, and as every woman knows, this is only a prelude to the cooking she will do later in the season and during the holidays.

Think of this and remember that thousands of women are already familiar with the new "CP" gas ranges and are secretly yearning to have one. How much more they're going to want one when they get back to serious cooking on their old worn-out equipment.

Last but most important is the demand for gas heating equipment in the fall. But this is too well known for lengthy discussion. We only want to point out that more people every day are becoming educated to "forced air" heating, just as they're becoming educated to *automatic* gas water heaters and "CP" gas

Every Half Hour, on September 9th, the Gas Exhibit in the Homes and Gardens

ranges. . . . We believe it is profitable to recognize this and direct sales efforts accordingly. Incidentally, proof of the foregoing statements that fall is range and water heater season is shown by the combined dealer-company sales report. This report shows that during September, October and November of last year, nearly 10,000 persons bought new automatic gas water heaters, and 13,500 persons bought new gas ranges. And last year, as every year, these fall totals were much larger than for any other season.

GAS RATES GO DOWN A-G-A-I-N!

1929-1930 . . . Introduction of natural gas brought saving of $8,172,000 a year.

1936 . . . Rates were reduced by $2,600,000 a year.

1938 . . . Rates were reduced by $2,000,000 a year.

1939 (August 1) . . . Gas rates were again reduced by $1,000,000 a year.

$28,510,000 combined yearly savings to gas and electric customers compared to rates in February, 1928.

P·G·and E·
PACIFIC GAS AND ELECTRIC COMPANY

Building Will Be the Scene of a Prize Drawing . . . Be There . . . It's Your Day!

Now 250 "Carboseal" Anti-Leak Users

Records show how this low-cost method corrects leakage in dry bell-and-spigot joints . . .

250 gas companies the country over are using "Carboseal" anti-leak to reduce leakage in bell-and-spigot joints in dry gas distribution systems with minimum trouble and expense. The results they have obtained you can expect to get in your mains. A few of these results are reported at the right.

How "Carboseal" Anti-Leak Works

"Carboseal" anti-leak is a scientifically developed liquid. It is normally introduced at high points in the mains and allowed to flow over the joints to the drips by gravity without interrupting gas service, or it can be sprayed into the mains by means of a hose. Expensive excavation is eliminated. "Carboseal" anti-leak cuts tar and gum deposits in the joints and saturates dried-out jute packing, swelling it to its fullest extent and stiffening its fibers, so that the packing fills the voids.

Joints treated in this way keep gas where it belongs because they are gas-tight, and remain tight indefinitely. Joints treated six years ago are still tight today on the soap test.

For further information about this effective and inexpensive method of correcting leakage in packed bell-and-spigot joints in distribution systems carrying dry manufactured or natural gas, write for "Carboseal" anti-leak bulletins, which will be sent without obligation.

TYPICAL REPORTS

NEW YORK STATE—In a system consisting of 14.7 miles of 3-in. equivalent low-pressure mains and 4.7 miles of 3-in. equivalent mains carrying 5 to 8 pounds intermediate pressure, the latter were treated with "Carboseal" anti-leak in 1936. The unaccounted-for gas volume was reduced 85.3 per cent by December, 1938—two years after treatment. This reduction was largely due to "Carboseal" anti-leak. The low-pressure mains in this system will be treated this year.

. . .

GEORGIA—In June, 1936, "Carboseal" anti-leak was applied 6 times in 4 weeks to 44,000 ft. of 4-in. main. Total unaccounted-for gas volume was reduced 60 per cent and bar tests showed elimination of joint leakage. The loss remained the same when metered in June, 1938.

. . .

ILLINOIS—A utility treated 545 cement joints in 4-in. main with "Carboseal" anti-leak at a total cost of $442.68, or 81.2 cents per joint. The annual leakage per mile of 3-in. equivalent main dropped 95.4 per cent.

. . .

TEXAS—In October, 1936, "Carboseal" anti-leak was applied to 881 ft. of 4-in. main. The annual unaccounted-for loss was reduced 96 per cent by this treatment. This figure was still the same when checked in March, 1938.

. . .

MISSISSIPPI—Shut-in meter tests showed a leakage reduction of 97.5 per cent after "Carboseal" treatment. Soap tests showed that even "blowing" leaks were eliminated.

For information concerning the use of "Carboseal" anti-leak, address

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

UCC

30 East 42nd Street, New York, N. Y.

PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

The word "Carboseal" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.

HIGH PRESSURES? A recently installed mechanical joint cast iron pipe line delivers gas during peak load at 460 pounds per square inch pressure. A hydrostatic field test at 600 pounds per square inch showed all joints were bottle-tight. Today's cast iron pipe with stuffing-box type mechanical joints, as made by CIPRA members, meets modern operating conditions with the same traditional efficiency which has characterized cast iron pipe throughout the life of the gas industry.

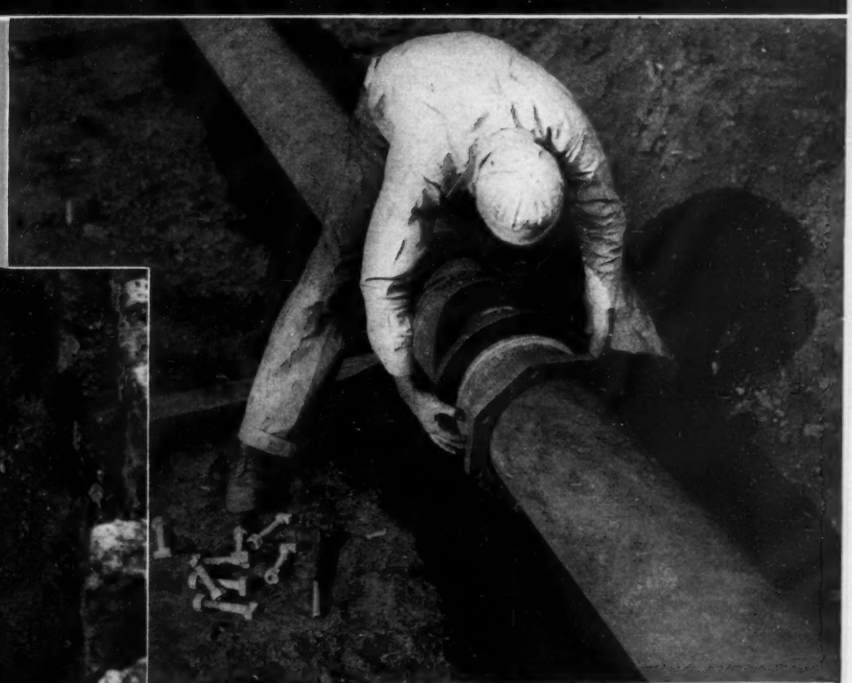
Look for the "Q-Check" registered trade mark. Cast iron pipe is made in diameters from 1¼ to 84 inches.

THE CAST IRON PIPE RESEARCH ASSOCIATION, THOMAS F. WOLFE, RESEARCH ENGINEER, 1013 PEOPLES GAS BUILDING, CHICAGO, ILLINOIS

CAST IRON PIPE

THE STANDARD MATERIAL FOR UNDERGROUND MAINS

Charleston, S. C. installed this cast iron gas main 102 years ago. Recent inspection showed it to be good for many more years.



Quickly assembled under any trench conditions, in any weather and with any labor is the bottle-tight mechanical joint.

Anyway you check it — beam strength, impact strength, crushing strength — cast iron pipe gives you ample margins of safety—*plus* long life, low maintenance and lowest cost per service year. We furnish U. S. Cast Iron Pipe any way you want it — pit cast or centrifugally cast by the Super-de Lavaud chill-free process — with bell-and-spigot, mechanical and flanged joints, or with plain or threaded ends.

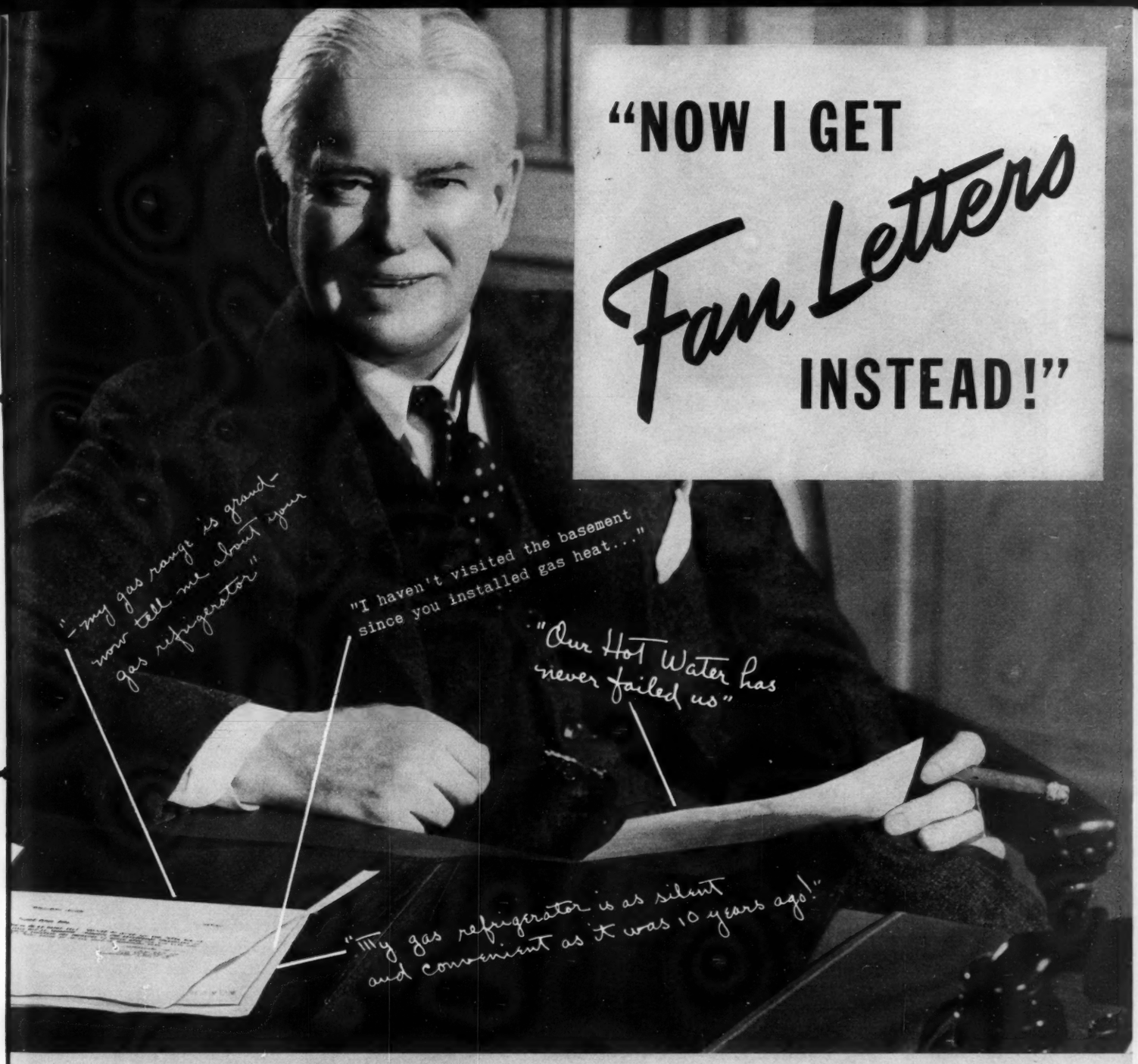
U.S. cast iron PIPE

for water works, gas, sewerage, drainage and industrial services.

U. S. PIPE & FOUNDRY CO.
General Offices, Burlington, N. J.

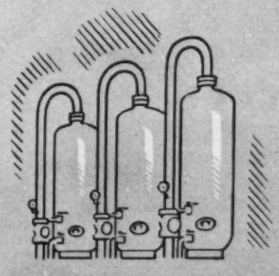
Plants and Sales Offices throughout the U. S. A.

Copyright 1939, U. S. Pipe & Foundry Co.


"NOW I GET
Fan Letters
INSTEAD!"
"– my gas range is grand– now tell me about your gas refrigerator"
"I haven't visited the basement since you installed gas heat..."
"Our Hot Water has never failed us"
"My gas refrigerator is as silent and convenient as it was 10 years ago!"

CLEAN GAS MAKES SATISFIED CUSTOMERS

The way to consumer goodwill is—clean gas. Clean gas flows freely through the small apertures of modern burners. Result: The delicate mechanisms function as they should ...your customer is pleased. But when gas appliances fail because of dirty gas, it hurts your goodwill and your business. *Blaw-Knox Gas Cleaners* are a proved and profitable investment. They not only reduce complaints, but they also cut maintenance expense on pump and station equipment. Send today for Blaw-Knox catalog No. 1581, describing this equipment and giving interesting information.

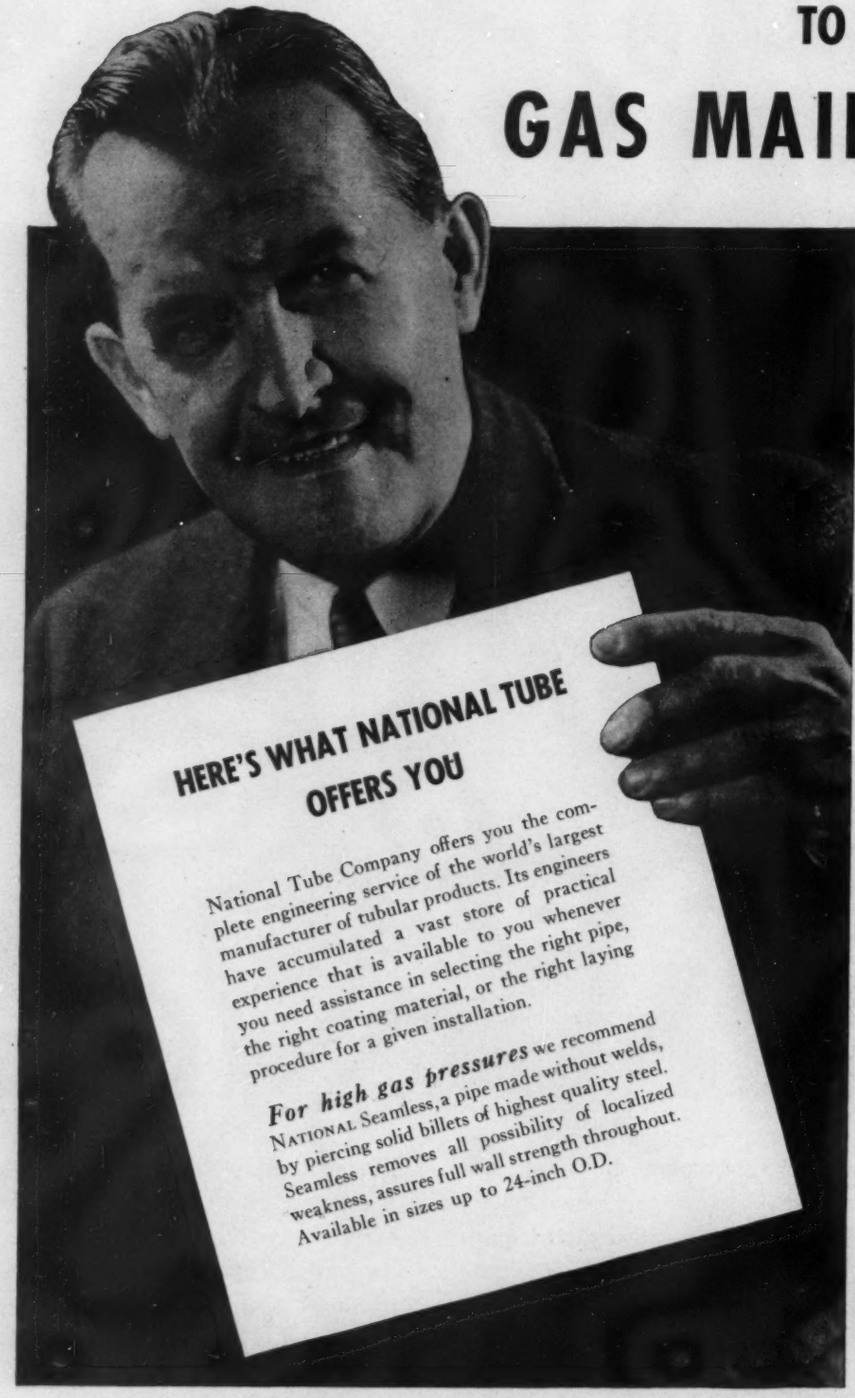


BLAW-KNOX
GAS CLEANERS

BLAW-KNOX DIVISION of Blaw-Knox Company · FARMERS BANK BLDG. · PITTSBURGH, PA.

Let STEEL *Supply the Answer*

TO YOUR GAS MAIN PROBLEM


HERE'S WHAT NATIONAL TUBE OFFERS YOU
National Tube Company offers you the complete engineering service of the world's largest manufacturer of tubular products. Its engineers have accumulated a vast store of practical experience that is available to you whenever you need assistance in selecting the right pipe, the right coating material, or the right laying procedure for a given installation.
For high gas pressures we recommend NATIONAL Seamless, a pipe made without welds, by piercing solid billets of highest quality steel. Seamless removes all possibility of localized weakness, assures full wall strength throughout. Available in sizes up to 24-inch O.D.

The Problem: How to provide adequate gas service that is low in first cost, high in dependability, and low in maintenance expense.

The Facts: To obtain low first cost, you must use easily available, inexpensive materials. To reduce laying costs use pipe that is light and easily handled, pipe that is available in long lengths, and thus requires fewer joints per mile.

To keep dependability high, your gas mains must not be subject to sudden fracture. You can't control earth settlement or traffic vibration, but you can use gas mains that are capable of withstanding this abuse.

Lower maintenance expenses can be achieved only by using gas mains that minimize repairs and damage costs from breakage and that give long service.

The Solution: STEEL Pipe. For STEEL Pipe is the only gas main material that gives you all these features. STEEL is a standard, readily available material. STEEL Pipe is made in lengths that save a number of joints per mile. STEEL Pipe is light and readily handled.

STEEL, in fact, is the toughest and strongest of all gas main materials. It is resilient, bends but does not break when subjected to impacts and vibration. The smooth surface of STEEL Pipe readily adapts itself to protective coatings where soil is extra corrosive.

Write for complete information on NATIONAL STEEL PIPE for gas mains.

NATIONAL TUBE COMPANY

PITTSBURGH, PA.

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

CRANE PRESENTS:
The "UTILITY TWINS"
STARRING THE NEW, NOS. 422 and 423
200-POUND, BRASS GATE VALVES
NO. 422 WITH INTEGRAL SEATS
NO. 423 WITH RENEWABLE SEATS

TWO new star performers join valvedom to serve you —the Nos. 422 and 423 Crane Brass, Solid Wedge, Gate Valves.

We call these valves the "Utility Twins" and that's what they are—ideal for all-around, hard service on 200-pound steam, water, oil, or gas lines. The No. 423 is made with renewable seats and disc of Crane Nickel Alloy—a metal that's matched to the needs of really tough jobs of flow control. The 422 has integral seats and a Nickel Alloy Disc. Both valves, proved in laboratory and field tests, are worthy of any piping system.

There's added utility in the twin-like design of the 422 and 423. Interchangeability of operating parts will show a saving in the need of spares. Advanced features that facilitate dismantling and re-assembly assure widest general usefulness. Both valves have slip-on disc connection.

But most important to you is that the 422 and 423 are Crane-Quality—all the way through. Just like all Crane valves, they are products of sound design . . . expert engineering . . . able craftsmanship—backed by elaborate research and manufacturing experience of over 84 years. To you, Crane-Quality in valves gives strongest assurance of dependable flow control at minimum cost.

GET COMPLETE INFORMATION IN BULLETIN 311

It will pay you to look into these new Crane valves. Bulletin No. 311 gives you all the interesting facts, sizes, prices. Ask your Crane Representative for a copy or mail the coupon below. Keep this folder handy—with your Crane No. 52 Catalog showing more than 38,000 valves, fittings, and piping items for every need.

CRANE

CRANE CO., GENERAL OFFICES: 836 S. MICHIGAN AVE., CHICAGO

VALVES • FITTINGS • PIPE • PLUMBING • HEATING • PUMPS

CRANE CO., 836 So. Michigan Ave., Chicago, Ill. G-9-39
Gentlemen: I want a copy of Bulletin No. 311 on the new Crane 200-pound brass gate valves. No obligation, of course.

Name.....

Address.....

City.....*State*.....

NATION-WIDE SERVICE THROUGH BRANCHES AND WHOLESALERS IN ALL MARKETS

GAS COMPANIES and DEALERS from coast to coast are tying-in with M-G-M's "The Women". Released September 1.

A METRO-GOLDWYN-MAYER PICTURE

Now playing

"THE WOMEN"

from the play by CLARE BOOTH

starring

NORMA SHEARER
JOAN CRAWFORD
ROSALIND RUSSELL

with

MARY BOLAND • PAULETTE GODDARD
PHYLLIS POVAH • JOAN FONTAINE
VIRGINIA WEIDLER • LUCILE WATSON

KITCHENS can be glamorous! Just see this one—all gas-equipped—for *The Women*. Or ask any neighbor who has a modern gas range and a gas refrigerator.

THREE "lovelies" in a scene from the picture, *The Women*—a brunette, a blonde, and SERVEL ELECTROLUX, the gas refrigerator.

Now THE WOMEN are playing *everywhere in*

MODERN ALL-GAS KITCHENS like these

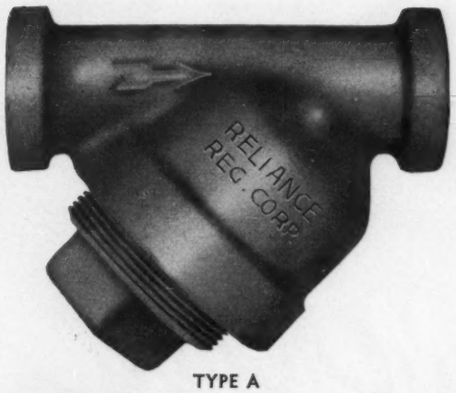
Be a good "casting director" for your own kitchen—go modern with gas! Do you know that the new gas ranges, for example, practically run themselves? They save time—cut down failures—and actually help foods to retain delicious, natural flavor.

You'll enjoy better automatic refrigeration, too. For Servel Electrolux, the gas refrigerator, is permanently silent. It has no moving parts in its freezing system—nothing to make noise or wear out.

Inspect the new gas appliances *at a dealer's or your gas company.*

SOUTHERN CALIFORNIA GAS COMPANY
SOUTHERN COUNTIES GAS COMPANY

GAS FOR THE 4 BIG JOBS ★COOKING ★WATER HEATING ★HOUSE HEATING ★REFRIGERATION



TYPE A

TYPE B

Reliance Dust Filters on house service lines protect your meters, regulators and all connected appliances.

Further protection is insured by installing a Reliance Dust Filter ahead of every individual unit, such as water heaters, ranges, furnaces, gas-steam radiators and other burners.

Keeping your house lines free from dust and scale with low-cost Reliance Filters will minimize your expenses for operation and maintenance.

Type "A" Filters are made in three capacity sizes for standard ¾" pipe connections. All models are available with female threads at both ends or with gasketed unions at either or both ends. Body castings will withstand working pressures up to 150 pounds. Installation can be made either horizontally or vertically.

Type "B" Filters are made for ¾" and 1" standard pipe connections with a gasketed union at one end.

A complete dust-proof barrier is built up between inlet and outlet connections, and the efficiency of the wool felt in the filter pad is not affected by moisture in the gas.

Send for Bulletin No. 35-A

RELIANCE DUST FILTERS

Cost Less Than Labor and Repairs

CLEAN GAS SAVES MONEY

REGULATORS YOU CAN RELY ON
RELIANCE
SINCE 1910
TRADE MARK

RELIANCE REGULATOR CORPORATION
1000 MERIDIAN AVENUE ALHAMBRA, CALIFORNIA

RELIANCE

UNIVERSAL GAS RANGES

• Mercury—Monitor Universal Gas Ranges are sensationally different—they are new in design as well as distinctly new from a construction standpoint. Mercury—Monitor ranges have a clean, smooth appearance—a distinctive modern styling that has an immediate appeal. Of equal importance, Mercury—Monitor ranges are equipped with advanced devices that guarantee a new and higher standard of performance in all divisions of cookery. These ranges give a new, scientific advancement to gas flame cooking.

New ONE-PIECE STEEL UNIT-BODY CONSTRUCTION

Mercury—Monitor ranges are of one-piece, steel unit-body construction, which type has been proved to be the strongest of all types of steel body structure. The one-piece, unit-body range is rust-proof in the true sense of the word, as the entire unit, both inside as well as outside, is porcelain enameled, in one piece, at one time. **NOTE:** Mercury Universal Range is equipped with an Elevated Broiler, Two Service Drawers and a Divided Cooking Top, whereas the Monitor has a conventional Broiler, Three Service Drawers and a Divided Cooking Top.

★ *Universal Gas Ranges* ★

CRIBBEN & SEXTON CO. • 700 N. SACRAMENTO BLVD. • CHICAGO

GAS
SEPTEMBER, 1939

GUEST Editorial

Bridging the Gap

By H. L. FARRAR
President, Pacific Coast Gas Association

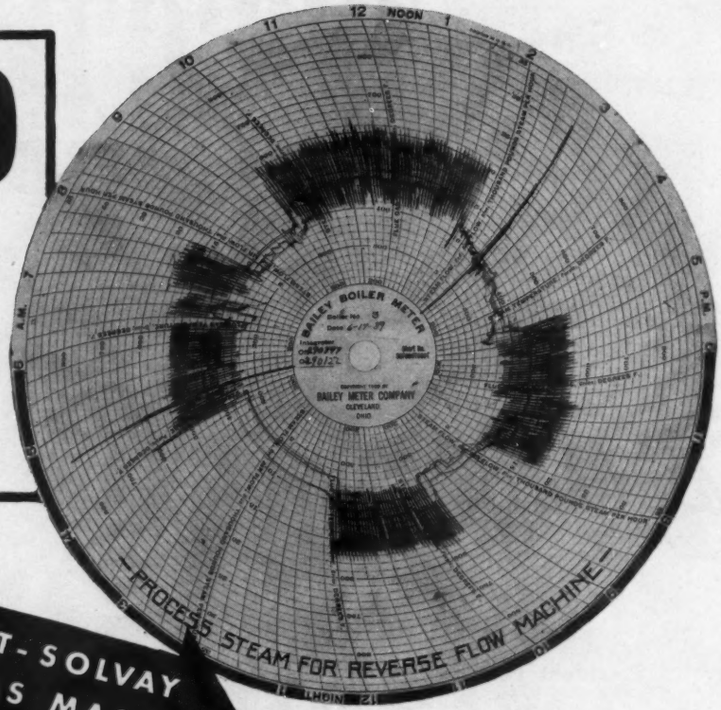
NO MATTER how much the gas utility liberalizes its free extension rules there are some new homes just beyond the limit. Recently building stimulus has induced many to move farther from congested centers where moderate priced houses can be built on larger grounds. Where this new building has resulted in real estate subdivisions opening adjacent to existing mains no great problem has been created for the gas utility to provide service. However, in the case of new subdivisions a mile or more beyond existing mains or in the case of scattered houses built on acreage, many new residences cannot be supplied on a free extension basis. The problem of supplying such new residences generally becomes one of "now or never" for the gas utility, for unless gas is available at the time the house is completed the prospect will invest a considerable sum in competitive appliances. Later as more homes are built and a gas main is extended, home owners are either unwilling or unable to change their former fuel to gas because of the amount they have invested in other appliances.

To bridge the gap, between the time of original construction of such residences and the time when a gas main extension is profitable for the utility, the use of bottled gas will insure this business for the gas utility. This is not a new idea, as a number of utilities have adopted this very practice, but it has not been adopted to any great extent on the Pacific Coast, and the need for some such vehicle appears to be rapidly developing. A few California companies feature a regular utility service by installing two or more cylinders of liquefied petroleum gas with a gas meter so that customers are billed by meter readings the same as if they were obtaining service through regular gas mains. Customers now supplied with such service appear well satisfied and the utilities are assured of business on gas mains to be laid at a future date. While the company can usually operate such service without loss, naturally the profit, if any, is quite small. If the sales expense of obtaining new customers after they have installed high priced equipment for the use of other fuels is taken into consideration, as it should be, the serving of bottled gas for a year or two appears to be a good investment in those territories not too remote from existing mains.

STOP and GO

OPERATION IS HARD ON THE F.O.T.†, TOO

†Cost of Fuel + Oil—Tar removed.



BUT SEE WHAT THIS SEMET-SOLVAY REVERSE FLOW WATER GAS MACHINE DID ON FOUR SHUTDOWNS PER DAY!

PICTURED ABOVE is an actual operating time chart of a Semet-Solvay Reverse Flow Water Gas Machine located in New England. Four shutdown periods per day are certainly not conducive to the most efficient operation, yet notice that the FOT compares favorably with that of most water gas machines operating under far more favorable conditions!

Can *your* water gas machine match these results? Regardless of what fuel or what quality of carbureting oil best serves your needs, the chances are that the Semet-Solvay Reverse Flow principle can save you money, whether applied in a new machine or through modernization of your old machine. Why not write today for further information?

A TYPICAL DAY'S OPERATION

Total operating time	13.56 hours
B.T.U.	535
Fuel per M C F	13.3 lbs. coke
Oil per M C F, 4.85 gal. Heavy Bunker C	
Tar Removed per M C F*	1.179 gal.

AVERAGES FOR MAY

Fuel per M C F	13.30 lbs. coke
Oil per M C F, 4.85 gal. Heavy Bunker C	
Tar Removed per M C F*	1.172 gal.
B.T.U.	534
Average make per hr.**	133,018 cu. ft.
Reforming	32.5%

*Tar figured at 32% of enriching oil.
**Not pushing machine. Has made as high as 155,000 per hr.

SEMET-SOLVAY

ENGINEERING *Engineers* **CORPORATION** *Contractors*

SEMET-SOLVAY ENGINEERING CORP. WE SELL SOLUTIONS TO HARD PROBLEMS NEW YORK

40 RECTOR ST. NEW YORK, N. Y.

THERMALLY *Thinking*

The Women

"The Women" must surely rank among the funniest comedies ever produced in the American theater. Cleverly satirical, amusingly entertaining, it met all the specifications for an enjoyable evening's entertainment at the theater. Of course, anything is liable to happen to a play, when the Hollywood boys get it on their plate. It is certain that some changes will be made in the lines. Anyway, we forgive them, for we do not remember a gas range in the stage version, but when it hits the screen "The Women" will show two completely gas equipped kitchens. In both, modern gas ranges and gas refrigerators will star along with glamor gals Norma Shearer, Rosalind Russell, Joan Crawford and Paulette Goddard. The A.G.A. has rightly called this to the attention of the industry, for these women in "The Women" are as modern as right now, and they couldn't prove it any more convincingly than by having their kitchens gas equipped.

Gadgets

Are gas appliances getting too complicated as we strive to build into them a theoretical perfection that may or may not be worth the effort—or cost? It is a subject that perhaps warrants some objective thinking. From the gas company viewpoint, does the additional load more than make up for the additional servicing expense many of these "gadgets" create? Can it be truthfully claimed that our customers appreciate and insist upon some of these refinements? It is conceded that a constant striving for improvement is a necessary factor in our growth. It is further granted that gadgets sell automobiles, vacuum cleaners and sewing machines. Incidentally, how many women use their vacuum cleaner attachments and sewing machine tucking, pleating and other doodads, once the supercharged enthusiastic voice of the salesman has faded from their eardrums?

It would be foolish to argue against the efficacy of the "gadget" as an equipment sales weapon. The point at issue, we feel, is that "gadgets" are creating a tremendous potential servicing problem, and perhaps our efforts could be equally profitably directed toward their simplification. But there must be no tampering, if you please, with anything that jeopardizes the safety of the customer.

Gas-Operated Radio*

Those who know F. X. Mettenet, vice president, The Peoples Gas Light & Coke Co., Chicago, know him as a top-notch gas sales executive with a keen sense of humor. Years ago, he facetiously—or was he serious?—suggested that we ought to have a gas-fired radio. At the time, it sounded more whimsical than prophetical, but the fact nevertheless remains that a gas-fired radio is now available in England. A company, Milnes Electrical Engineering Company, Ltd., has done the trick, according to an article in a recent issue of the British *Gas Journal*. With true British caution, the *Gas Journal* warns its readers:

> To those who visualize a future in which gas-operated sets will replace electric models on an extensive scale we would say at the outset that gas radio is not primarily intended to oust electrical plug-in sets. What the gas-operated wireless set will do, however, is stem the inroads of electricity into channels where gas has hitherto held the load.

The editor has in mind the hundreds of thousands of homes in Great Britain where gas does the lighting and the whole works and there isn't an inch of electric wiring to the block. The electric boys have been using the radio as the door-opener for further load.

The gas-fired radio operates with a thermopile or gas electric generator, with a flexible tube connection, and within a minute the generator develops its full output, of 4, 6.4, and 8 watts depending on the model. The 4-watt model uses a storage battery, but the 6.4- and 8-watt models operate directly. The 8-watt unit provides 1 amp at 6 volts, 2 amps at 4 volts and 4 amps at 2 volts approximately, and

*Pacific Coast Gas Association plans an initial demonstration of a gas-fired radio at its annual convention in San Francisco this month.

uses about 1000 B.t.u. per hour. A vibrator is used and with 2 volt juice at 2 to 3 amps from the thermopile, it delivers up to 150 volts at 15 to 20 amps, ample to operate any domestic radio. A steady output is controlled by a governor. It is estimated that using the set three and one-half hours daily and with gas at 20 cents a therm, the weekly cost of operation is 20 cents.

I like the way the editor cautions the gas industry about the way to merchandise these sets:

> The handling of the sets comes within the province first and foremost of the reputable dealers. Any attempt to cut across their market by selling radio sets independently through the gas showrooms will only have the effect of antagonizing the very people through whom the most valuable sales contacts can be made. This, essentially, is a case of co-operation with the legitimate dealers and not for competition with them.

Right! But, if it is true of radio, why isn't it equally true of all gas appliances which have an electrical prototype, and which the aforesaid reputable dealer has proved he can handle competently?

Anyway, though Leonardo da Vinci never lived to see the flying machine he designed, Mettenet has lived to see his gas-fired radio.

World's Fair Note

Visitors to the New York World's Fair seem unanimously agreed that its marvelous electric lighting with its colorful and unique effects at night steals the show. It is a timely tribute to the electric lighting engineers, who have worked miracles in fact.

But gas lighting plays a prominent part in one of the most spectacular features of the Fair over and above the Court of Flame itself in the Gas Exhibits building. We refer to the colored fountain displays staged every night. Few visitors and few gas men, for that matter, appreciate the vast experimentation, research, and engineering behind the use of gas in this display.

It might be well to talk it up among our friends who are visiting the Fair. It will be at least another "modernistic" tag on gas service, which is indeed the fuel bin for the greatest exhibit of its kind ever produced.

The Therm

A reader writes, apparently apropos our recent series of "Mass Market" articles by Stanley Jenks, appearing in our February, March, June, July and August, 1939, issues:

> There is a great deal said about therms in your *GAS* magazine, but nothing about how many B.t.u.'s per therm. Would you please give a full explanation of this question?

Glad to oblige. The therm is a gas unit, first adopted in England, consisting of 100,000 B.t.u.'s no matter what kind of gas or fuel is used. The British adopted it to give themselves more flexibility in the calorific value of the gas supplied. Several companies adopted it in this country to anticipate many objections from the public that might arise in connection with change-overs from manufactured to mixed or natural gas with higher calorific values. Frankly, a cubic foot of gas means nothing, for it is only comparable with cubic feet of gas of exactly the same heat value. Unless we also know the B.t.u. value of the gases or consumptions being compared, it is impossible to make comparisons except volumetrically.

In the "Mass Market" series of articles, therms were used consistently in evaluating load expectancies, in order that there could possibly be no confusion or doubt. On the other hand, had the author used cubic feet, although discussing manufactured gas, the question would naturally arise, whether he was talking about anything from 450 to 600 B.t.u. gas.

It is a pity the therm has not more general acceptance in the industry. It would be an advantageous standardization. In the electrical industry a kilowatt hour is 3413 B.t.u.'s in Podunk and everywhere else. With us a cubic foot of gas is anything from 450 to 2700 B.t.u.'s depending on the kind of gas.

The therm could make it all so much simpler, and some day—maybe—we'll get around to it.

Hello, Broadway

The big days (and bigger nights) will soon be here when the gas industry descends "en masse" on New York to hold its Twenty-first Annual Convention. It is especially attractive this year because supplementing an excellent program, many gas men will have their first opportunity to see their own building and exhibits at the New York World's Fair. Incidentally, there are other attractions over there in Flushing under the sign of the sphere and Trylon.

Early reservations indicate a record convention attendance, but don't let that discourage you. There are splendid reservations for all. New York is "some" town, you know. And don't let these rumors of abnormal expense get you down. 'Tain't so. While it is generally recognized that New York is the best organized city in the world to take it away from you, the fact still remains you can enjoy New York and spend just as little or as much as you please in doing so. It's a matter of taste.

The best exhibits at the Fair are free. And, above all, if the national convention is the place to meet your friends from all corners of the country, then this year you must come to New York, for they are bound to be there too.

In case you forget, the dates are October 9-12.

The Partial Dehydration

Of High Pressure Natural Gas ... An Original Research Into Its Various Phases ... A New Design of Direct Contact Cooler

B. M. LAULHERE and C. F. BRISCOE
Southern California Gas Company*

IN connection with the calculation of the water vapor content of compressed natural gas, the writers, while setting up factors involving equilibrium constants for the several hygroscopic materials considered suitable for the absorption process of dehydration, became aware of the need for more accurate data on the vapor phase of natural gas-water systems. A search of the literature, while yielding no data that could be used in lieu of more expensive original research, did, however, confirm the need for the study.

In order to develop the desired physical data the research apparatus, a flow diagram of which is shown in Fig. 1, was set up and a study made of the pertinent factors over the pressure range from 10 lbs. to 500 lbs. per sq. in. ga. respectively, at temperatures of 60°, 80°, 95° and 110° F. With very moderate extrapolation the data may be used for any water vapor calculations likely to be encountered.

The three stage compressor on the extreme left of Fig. 1 was supplied with natural gas under approximately 10 lbs. per sq. in. ga. pressure and discharged it under a pressure of 1500 lbs. per sq. in. ga. into an after cooler where the heat of compression was removed and the water vapor concentrated by the compression condensed. The gas then passed through a small drip where the condensate was separated from the gas stream and thence through an aluminum oxide dryer in which the water vapor content was lowered to prevent condensation in the high pressure storage or supply tanks resulting in subsequent regulation difficulties due to freezing. The tanks used for this service were eight in number with working pressure ratings of 1800 lbs. per sq. in. ga. Since the compressor capacity was far in excess of the flow requirements for the apparatus, it was necessary to operate it for short periods of time only.

From the supply tanks the gas passed through a specially constructed Reliance regulator into the saturation chamber and thence by way of a coil submerged in a water bath to a series of orifices where it issued from the pipe into direct contact with the water. The latent heat of vaporization as well as the heat required to maintain the water at a temperature sufficiently high enough to insure the evolution of a generous quantity of water vapor was supplied by throttling steam into the other coil indicated in the flooded portion of the vessel. A small hydraulic testing pump served at intervals as the water makeup injector.

B. M. LAULHERE

C. F. BRISCOE

From the saturation chamber the water vapor laden gas flowed through a well insulated tube to a coil immersed in the temperature controlled water bath surrounding the equilibrium chamber and thence into the chamber proper at its lower end. The function of this coil was to effect enough cooling to insure a saturated condition in the gas with respect to water vapor, and since the presence of liquid water was not objectionable at this point, the condensate was allowed to be deposited in the bottom of the equilibrium chamber from whence it was periodically released through a bleeder into the bath water.

Particular attention is called to the glass wool packing which occupied the lower portion of the equilibrium chamber and to the free space above it. The gas velocities through this vessel were so extremely low as to preclude any possibility of liquid entrainment which obviously could not be tolerated. The outlet pipe was also designed to prevent any tendency for liquid to leave with the sample being withdrawn for test. A mercury column was employed for low ranges of gas pressure measurement up to approximately 50 lbs. per sq. in. absolute and a test gage of the Bourdon tube type, calibrated against a dead weight tester daily, served for higher pressures.

In order to minimize the influence of the temperature of the bath on the measurement of the gas temperature within the equilibrium chamber, an insulated thermometer well was designed to accommodate a Bureau of Standards calibrated flow calorimeter thermometer. This well was insulated by 1/16-in. thick fibre from the threaded nut portion which in turn was fitted with a dam to keep the bath water from contact with the well proper. In use this thermometer required about 15 minutes to reach a steady state condition following a change in flow rate and it was found that reproducable results were obtained with ease by allowing approximately one hour elapsed time following such changes before moisture determinations were made.

The occurrence of condensation due to expansion of the gas upon being reduced in pressure was eliminated by the installation of a heater on the throttle valve. The valve was equipped with a thermometer well soldered to the body proper to facilitate control of the valve temperature. The gas passing this valve was separated into two streams, one of which passed to the phosphorous pentoxide drying tubes and the other to the atmosphere; the ratio of these respective quantities being varied depending upon the pressure. However, the volume of gas blown to the air was only sufficient to insure against a stagnant condition in

*A report of the Transmission Committee Subcommittee on Pipe Lines, to be presented for discussion at the Forty-sixth Annual Convention of the Pacific Coast Gas Association, San Francisco, Calif., September 6-9, 1939.

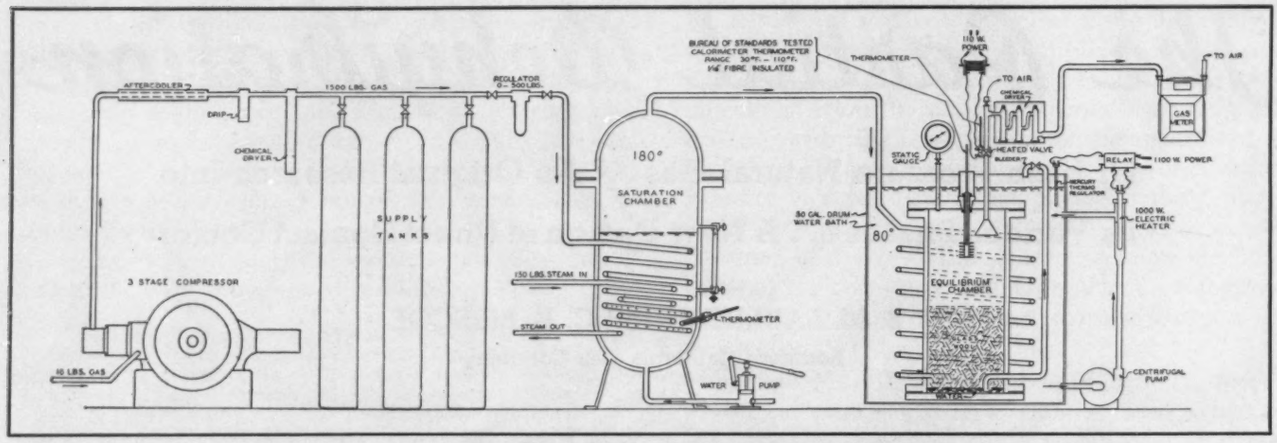


FIG. 1. Flow diagram of natural gas water vapor research apparatus.

the tube with possible cooling and condensation during intervals when the drying tubes were not in place.

As just mentioned, the drying agent used was phosphorous pentoxide, and three tubes in series were used in the absorption train. Gas volume measurements were observed with the aid of a special type of dry test meter reading to .001 cu. ft. which was proven at intervals.

The water bath temperature was maintained by the use of a mercury type thermoregulator and relay operating a 1000-watt electric heater. A motor driven centrifugal pump circulated the bath water; adequate head on the pump discharge being available to keep the bath well agitated. Temperature fluctuations of .05° F. were enough to operate the relay and the maximum bath temperature change was kept within this limit.

For determinations at 60° F. a small portion of the bath water handled by the centrifugal pump was bypassed through a water cooler not shown in the flow sheet and returned to the bath tank. In this manner the heat gain of the system was more than taken care of and the thermoregulator operated heater was used to regulate the temperature. The limits of variation in temperature were therefore the same for the 60° operations as for the higher ranges.

Combustion Analysis

Following is an average combustion analysis of gas samples taken at intervals during the tests. Carbon dioxide, 0.60 per cent; oxygen, 0.20 per cent; methane, 85.3 per cent; ethane, 13.5 per cent.

In reviewing the test data it was noted that the deviation of the water in the vapor phase of the natural gas-water system varied from roughly 3 per cent higher at low pressures to approximately 30 per cent greater at high pressures than the air humidity table values.

The values at low pressures, which were consistently about 3 per cent higher than humidity table data for saturated air, caused some doubt in the authors' minds as to the accuracy of the work. It was thought that possibly a true equilibrium was not attained but instead, a metastable one which produced a super-saturated condition due to the fact that saturation was attained by condensing out water from the gas. To explore this possibility, some runs were made wherein saturation was obtained by maintaining the saturator at a lower temperature than the equilibrium chamber temperature, and allowing the gas to approach saturation by contact with the wet equilibrium chamber packing under the same previous flow rate conditions. This approach to equilibrium from the opposite side, one would expect, would produce an undersaturated condition in the gas. The results obtained confirmed the values previously observed within the probable experimental error of the apparatus.

It was then suspected that the slight deviation from the humidity tables might be due to the characteristics of the gas since an attraction is known to exist between water and hydrocarbons. This attraction is exemplified by the formation of gas hydrates under favorable conditions. To check whether this reasoning was valid, determinations were made with air as the "indifferent" gas at 95° F. and 35 lbs. per sq. in. ga. pressure. Four observations which checked each other showed the water quantity to be identical with the amount found in the natural gas under similar conditions.

On the basis of these results it was concluded that for the determination of water vapor in gas under pressure in transmission pipe line systems, the values as determined and shown in Fig. 2 were applicable.

Direct Contact Cooling

One of the limiting factors in the partial dehydration of natural gas either by the atmospheric cooling or refrigeration methods is the formation of hydrocarbon hydrates. Since the formation of these hydrates is reported to proceed only under the proper relationships of gas pressure, temperature, velocity and moisture content, it seemed logical to suppose that the presence of a large excess of water above that required to saturate the gas might prevent their formation. The means chosen to supply this excess of water and at the same time perform the cooling function, was the direct contact cooling method.

The principle involved in this system is to inject into a suitable contact tower, water previously cooled by any practical means such as steam jet evaporation, mechanical refrigeration or as used in the plant hereafter described; water cooled by atmospheric evaporation.

Referring to Fig. 3, which is a flow diagram of the process, it will be noted that the high pressure gas to be treated enters the contact tower at the bottom just above the water level. This gas is saturated before it enters the contactor so it is obvious that all heat extracted from the gas must be due to sensible transfer to the cooling water. The gas passes upward through a spiral series of horizontal baffles which consist of wide slats equal in length to the inside diameter of the shell and having their ends trimmed to conform to that surface. These baffles are held in place by a rod or pipe (the longitudinal axis of which is coincident with that of the

contactor shell) and small reinforcing strips.

Having passed through this series of baffles in counter flow to the cooling water, the gas enters a gas-liquid separator where any moisture mechanically entrained in the baffling is extracted before the cooled gas leaves the contact tower by way of the gas discharge pipe leading to the main line. The water separated from the gas in the top of the tower is allowed to drain under the force of gravity back into the water circulating system between the contactor sump and the vent column as shown in the flow sheet.

The direct contact water collected in the contactor sump flows from a connection in the bottom of the tower to the vent column where any gas not in solution is allowed to separate and finds its way up the liquid separator drain line, into the gas-liquid separator and thence out the gas discharge opening.

Contact Water Cooled

The gas-free water is then drawn into the suction of the contact water pump under a pressure only slightly below that of the high pressure gas being treated. The contact water pump discharges this water through a heat exchanger consisting of two atmospheric type Griscom-Russell bentube sections. Here the contact water is cooled by cooling tower water and thence is discharged into the top of the contact tower through a slotted distributing pipe located just above the baffling.

The cooling tower water circulated over the contact water heat exchangers

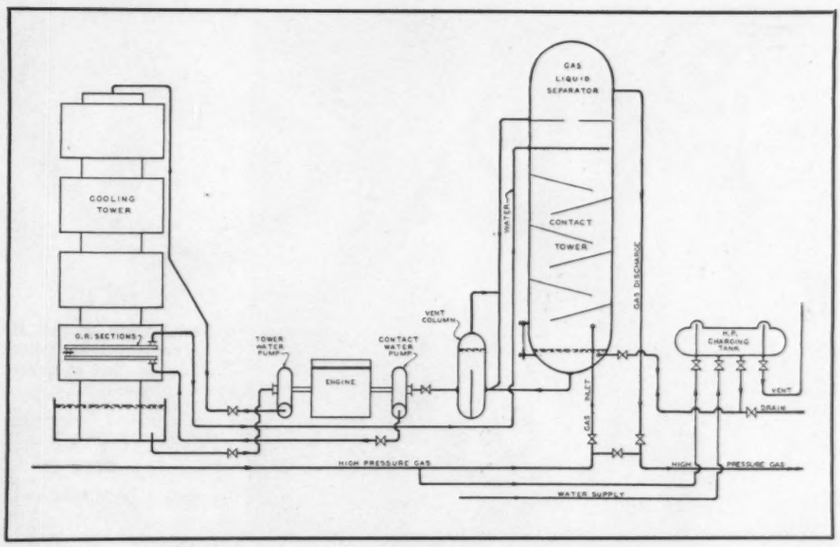


FIG. 3. Flow diagram of direct contact dehydration process.

is handled as indicated by a separate low pressure pump driven by the same gas engine which operates the contact water pump. In order to facilitate the injection or removal of water from the high pressure system, the high pressure charging tank shown on the right was installed. With this auxiliary, water may be injected into the contactor sump from the water supply, removed from the sump, æriated and reinjected or may be blown down from the sump directly into the drain.

This same principle of direct contact may be applied in a slightly different manner by having a liquid level control located in the bottom of the contact tower which would release the water accumulated there to atmospheric pressure, discharging it directly to the top of the cooling tower. The water thus released would then flow to the tower basin where it would be picked up by a multistage pump and reinjected into the contact tower. Where high pressures are involved the pumping cost for this alternate plan would, of course, be considerably greater than for the closed system shown in the flow diagram.

An Aerial View

Fig. 4 shows an ærial view of the direct contact cooling plant installed by Southern California Gas Co. at Kettleman Hills. This plant has a designed capacity of 38,000,000 std. cu. ft. of gas per day having a specific gravity of approximately .65, and was designed to operate at 400 lbs. gage pressure. The cooling range is from 58° F. to 52° F. and a pond water temperature of 46° F. was assumed for the design condition.

Basing the calculations on averages of the observed values over the entire test run, the overall rate of heat transfer in the direct contactor was found to be approximately 38 B.t.u. per hr. per sq. ft. per °F.

There are several aspects of the process upon which observations are still being made, but the overall rate of heat transfer as well as the cooling range contemplated in the original design of the existing plant have been verified as far as cooling capacity is concerned. However, one of the characteristics still under study is the tendency for the differential across the contactor to increase continually when the inlet water temperature is maintained below 52° F. In all probability this is due to gas hydrate accumulations. One convenient way to take care of oper-

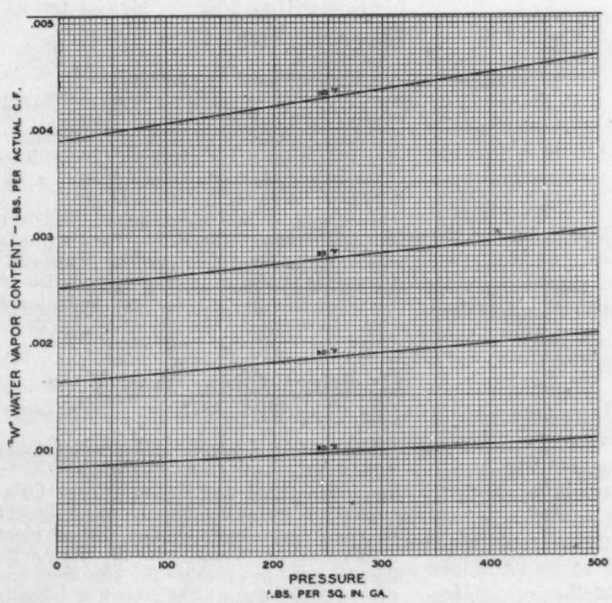


FIG. 2
Water vapor content of compressed natural gas.

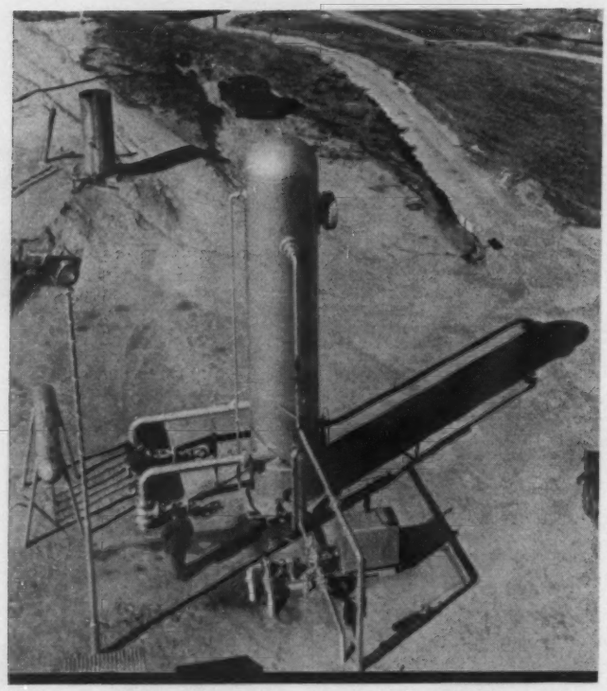


FIG. 4

Aerial view of the direct contact dehydration plant installed at Kettleman Hills.

ations below this temperature would be to add an inhibitor to the contact water. The preliminary work already completed in the Southern California Gas Co.'s laboratory was confirmed by the findings of Hammerschmidt.[1]

In addition to the study of the effect of the higher alcohols on the decomposition temperature of gas hydrates, experiments on sodium chloride and urea indicate that these two chemicals in the concentrations of 5 per cent and 10 per cent respectively, would be adequate to meet the worst condition at the plant under discussion. Calculations on cyanamid show that it might also be effective for use as an inhibitor. Since these materials would have a negligible vapor pressure, they might prove to be more economical to use than the alcohols.

1 "Preventing and Removing Gas Hydrate Formations in Natural Gas Pipe Lines"—E. G. Hammerschmidt, A.G.A. Natural Gas Section, 1939. See *G A S*, May, 1939, page 30.

A. G. A. Laboratories Test Boltless Pipe Couplings

WITHIN the last few years, a number of couplings of the so-called "boltless" type have been developed and employed in the installation of steel pipe in commonly used sizes for underground gas services. Due to the increased use of these couplings and certain advantages which they appeared to possess, the Subcommittee on Pipe Joints and Pipe Materials of the Distribution Committee felt it desirable to obtain essential facts in regard to their performance based on actual tests. It was considered that the information secured could then be employed in the development of suitable specifications to cover such couplings.

Considerable preliminary work on this subject was conducted by a member utility company about a year ago and results indicated that these couplings, employing gaskets of the conventional type, were capable of withstanding leakage under extreme conditions such as might be produced by underground movements. Special testing apparatus was constructed which permitted the application of repeated longitudinal movements through a specified distance while the couplings were maintained under air pressure. As a check on the results obtained and to secure additional data along similar lines, the Laboratories were recently requested by the subcommittee to undertake further tests on boltless couplings in selected sizes.

Considerable discussion took place on the test procedure to be employed during the recent distribution conference held in Chicago and plans were concluded at a meeting of the Subcommittee on Pipe Joints and Pipe Materials for the conduct of the present work. These call for the selection of couplings in the ¾-in., ½-in., and 2-in. sizes as representative of this range and their subjection to three series of tests. The first will consist of repeated longitudinal movements using the special equipment formerly designed for that purpose. The second will consist in applying lateral deflections of the pipe with the coupling maintained at a fixed position up to the point where a metal binding between the pipe and coupling takes place. A third series of tests will be carried out using a testing machine in which the coupling will be subjected to a crushing load to determine the point at which leakage occurs.

In all cases the couplings will be made up on the pipe specimens following the installation procedure recommended by the respective manufacturers. The test specimens will then be maintained under an internal pressure of 100 lbs. per sq. in. throughout all the tests.

Samples have been obtained and the necessary equipment mounted for the carrying out of the work outlined. The information developed will be made available to the subcommittee supervising the project for its review and decision as to the necessity for extending the project further. It is believed that at the completion of the work outlined, specifications can be prepared which will insure the ability of couplings of this type to successfully withstand the conditions which they are often called upon to meet in service.

■ ■

Greenville, Mich., Soon to Have Natural Gas Service

A changeover to natural gas will be made soon in Greenville, Mich., it has been announced by Clyde Svoboda, local manager of the Gas Corporation of Michigan, subsidiary of the Great Lakes Utilities Corp. The changeover necessitates construction of a 20-mile pipe line from the Winfield pool.

According to N. Henry Gellert, president of Great Lakes Utilities Corp., natural gas will be served by mid-September. Charles M. Sturkey, president of the Gas Corporation of Michigan, was in charge of the preliminary work of making the changeover.

■ ■

Cushing, Okla., Will Vote On Gas Franchise

The City of Cushing, Okla., was to vote August 29 on a franchise to be granted to the Consolidated Gas Utilities Corp., Oklahoma City, Okla. The franchise provides for the construction and operation of a gas plant for a period of 20 years, with the city reserving the right to purchase the system at any time. Natural gas will be served.

GAS on Parade

• From far and near the Gas Industry this month sends its delegates to the Pacific Coast Gas Association's 46th Annual Convention in San Francisco.

"COME join the Parade"—that is the invitation of President H. L. Farrar to all members of the Pacific Coast Gas Association who are scheduled to gather at the Association's Forty-sixth Annual Convention at the Fairmont Hotel in San Francisco on September 6, 7, 8, and 9 to deliberate and to discuss, to appraise and applaud the onward march of Gas as it goes parading past, displaying its achievements of the past and promising its progress for the future.

The first General Session meeting will take place Wednesday morning, and a note of gaiety will start off the convention when Roland Telfer and Company present the "Gas Follies." Following this bit of frivolity, P. M. Downing, vice president, Pacific Gas and Electric Co., will welcome the delegates to San Francisco, after which President Farrar in his address, "Gas on Parade," will outline the achievements of the industry and the Association during the past year.

R. E. Fisher, vice president, Pacific Gas and Electric Co. and chairman of the Gas Industry Exhibit Committee, will direct attention to the Golden Gate International Exposition when he discusses the results and the possibilities of the Pacific Coast Gas Exhibit. Following the election of officers, an invitation from the Canadian Gas Association will be extended to the P.C.G.A. membership by E. W. Bowness, vice president, Canadian Western Natural Gas, Light, Heat and Power Co. Final address on the opening program will be a paper, "The Psychometric Chart," by William Goodman, consulting engineer, Trane Co. The meeting will close with "In Memoriam."

To pursue the course of the General Sessions, delegates must rise early enough to be in the Fairmont Hotel's Gold Room by 9:30 Thursday morning, where they will be aroused to full wakefulness by a skit, "Why Meter, and How!" an offering of the Woman's Committee, featuring in its cast Zita O'Connor and Eleanor Gemmell of the Pacific Gas and Electric Co. The remainder of the program will be devoted to "16,000,000 Headaches — A Series of Discussions on Ways of Dealing With People,"

Three speakers will feature the Friday morning General Session meeting: "Gas Refrigeration Speaks," a presentation by Servel, Inc.; "Actionized Selling," Carl Sorby, sales promotion manager, Geo. D. Roper Corp.; and "We Have the Answer," by R. S. Agee, promotion manager, Association of Gas Appliance & Equipment Manufacturers.

Saturday, September 9 has been designated as Gas Industry Day at the Golden Gate International Exposition.

R. G. Logue, Ward Heater Co. and chairman of the Manufacturers Section, will open the Wednesday afternoon joint meeting of the Manufacturers and the Domestic Sales Committee. W. R. Smith, vice chairman, will speak on "Cooperation With the A.G.A.E.M." Following the election of officers will be the reports of the Product Division chairmen: direct heating, J. S. Andrews, Andrews Heater Co.; furnaces, Don Fleming, manager, Electrogas Furnace Co.; ranges, George Hammer, president, Hammer-Bray Co.; water heaters, A. H. Sutton, president, Mission Water Heater Co.

Three speakers will share the latter half of the session. Stanley A. Weigel, attorney, will discuss "What's Fair and Unfair in Trade," while Fred E. Yerger, Bank of America, will have as his topic, "Financing Appliance Sales." William H. Vogan, supervisor, Los Angeles Branch of the A.G.A. Testing Laboratories, will discuss the activities of the Laboratories.

H. G. Laub's (Southern California Gas Co.) Technical Section will swing into four-barrel action Wednesday afternoon with parallel meetings of the Distribution, Production, Transmission, and Utilization Committees. Heading the Distribution Session will be C. P. de Jonge, San Diego Consolidated Gas and Electric Co., under whose committee fall the Leakage, Meters and Regulators, and Construction and Maintenance sub-committees, headed respectively by D. B. Larson, Portland Gas and Coke Co.; W. A. LaViolette, Pacific Gas and Electric Co.; and L. L. Biggs, Southern California Gas Co.

A. R. Bailey, Coast Counties Gas and Electric Co., will introduce four speakers at the first Production Committee meeting: R. M. Bauer, Southern California Gas Co.; F. F. Doyle, Pacific Gas and Electric Co.; C. Eldon White, San Diego Consolidated Gas and Electric Co.; and H. J. Smith, Pacific Gas and Electric Co.

Three sub-committees will report at the first meeting of the Transmission Committee under S. S. Donaldson, Southern California Gas Co.; Compressor Plants, T. Hume West, Industrial Fuel Supply Co.; Large Volume Measurement, T. K. M. Smith, Industrial Fuel Supply Co.; and Pipe Lines, C. F. Briscoe, of Southern California Gas Co.

M. A. Richford, Pacific Gas and Electric Co. and chairman of the Utilization Committee, will likewise hear reports from the sub-committees on Appliance Testing, J. C. Mueller, Payne Furnace and Supply Co., chairman; on Appliance Installation, R. I. Snyder, Southern California Gas Co., chairman; and on Special Problems, J. R. Dresen, Public Service Company of Colorado, chairman.

Technical Section activities will come to a close with a general meeting on Friday afternoon which will include an address by Chairman Laub and the showing of a motion picture, "Repairing Leaks by Welding," by C. P. de Jonge. Air conditioning will be the subject of Glen Miller of the Southern Counties Gas Co., while Charles P. Smith, Pacific Gas and Electric Co., will deliver an address on developments in meteorology and their application to gas dispatching. A. F. Bridge, Southern Counties Gas Co., will deliver a progress report on "Calorimetry Standards." A pictorial study of flow through regulators will be presented by W. A. LaViolette.

The Wednesday afternoon meeting of the Accounting Section will be under the leadership of Chairman G. M. Thomas, Pacific Gas and Electric Co., and will offer two papers: "Depreci-

ation Accounting," H. T. Ryan, Pacific Gas and Electric Co., and "Plant Accounting," R. N. Dreiman, Coast Counties Gas and Electric Co.

The Friday afternoon meeting will feature A. A. Charonnat, Pacific Gas and Electric Co., and L. W. Coughlan.

The first afternoon's activities will be rounded out by the Woman's Committee meeting under Chairman Zita O'Connor, Pacific Gas and Electric Co. Speakers will be Prudence Hury, Southern Counties Gas Co.; Freda Raban, Seattle Gas Co.; Edith Hammond, Pacific Gas and Electric Co.; Rea Mae Prendergast, Coast Counties Gas and Electric Co.; Bena M. Chaney, San Diego Consolidated Gas and Electric Co.; and Madeleine Bast, Pacific Gas and Electric Co.

The women delegates will again step into the spotlight at the Home Service Luncheon to be held Friday with Katherine L. Rathbone, Southern Counties Gas Co., chairman. Home Service authorities Gladys Price, chairman, A.G.A. Home Service Committee; Jessie McQueen, A.G.A. Home Service counsellor; Pauline Edwards, Home Service director, Honolulu Gas Co., Ltd.; and Cleo Filsinger, appliance counsellor, Pacific Gas and Electric Co., will be the speakers.

The Sales and Advertising Section will hold its meeting under Chairman H. W. Edmund, Coast Counties Gas and Electric Co., on Friday afternoon. Following the address of Chairman Edmund, seven speakers will take the rostrum, each dealing with a different phase of sales activity. N. O. Fratt, Seattle Gas Co., will lead a symposium, "Getting Fun Out of Selling"; W. H. Howe, Tucson Gas, Electric Light and Power Co., will relate how the dead service is brought to life; L. F. Galbraith, Pacific Gas and Electric Co., will have as his topic, "How Utility Promotion Aids Water Heater Sales." M. C. Mainwaring, British Columbia Electric Railway Co., Ltd., will review his experiences with an appliance rental plan, while A. F. Rice of Southern California Gas Co. will tell us "Where We Stand in Domestic Sales." Progress in commercial and industrial sales will be reviewed by Louis Wollenberger, Coast Counties Gas and Electric Co., and "Home Service's Part in Sales Promotion" will be told by Katherine Rathbone.

Friday afternoon will see the commercial and industrial salesmen in committee meeting with Louis Wollenberger, committee chairman, conducting the meeting. The speakers will include J. H. Gumz, Pacific Gas and Electric Co.; H. M. O'Haver, Southern California Gas Co.; W. L. Badger, Dow Chemical Co.; E. H. Adler, San Diego Consolidated Gas and Electric Co., Ray Trowbridge, Seattle Gas Co.; and A. F. Michael, Southern California Gas Co.

Liberal arrangements have been made for the entertainment of the delegates during their stay in San Francisco. Evenings have been left free so that there will be time for visits to the Golden Gate International Exposition on Treasure Island. The Annual Men's Golf Tournament has been moved up to Thursday afternoon at the California Golf Club, and awards will be made at the Annual Banquet. The Second Annual Skeet Shoot for the perpetual plaque presented by H. R. Basford will be held Thursday at the Pacific Rod and Gun Club. Any number of teams may represent one company.

Three functions highlight the entertainment provided for the ladies. On Wednesday afternoon at the Room of the Dons, Mark Hopkins Hotel, there will be a reception and tea. On Thursday there will be a luncheon at the Yerba Buena Club on Treasure Island, while a luncheon and bridge will be held Friday at 11:30 A. M. at the California Golf Club. Mrs. H. L. Farrar is the convention hostess.

F. F. Doyle is general chairman of the convention. K. C. Tomlinson is in charge of entertainment. C. B. Babcock is chairman of the Gas Industry Day Program. Convention committee subchairmen are as follows: Properties, P. E. Beckman; golf, E. J. Hinchey; skeet, C. L. Kirksey; publicity, A. C. Joy; registration, A. J. Noia; banquet, V. I. Thompson; transportation, E. C. Wood.

Grand climax to the convention will come on Friday evening with the holding of the Annual Banquet and Dance. Incoming officers will be installed at the banquet and the delegates will hear the report of the Awards Committee, of which Clyde H. Potter, Southern Counties Gas Co., is chairman.

Chairmen of the Convention

F. F. DOYLE
General Chairman

C. JOHNSTONE
Managing Director

H. G. LAUB
Technical

H. W. EDMUND
Sales, Advertising

H. MUSGRAVE
Educational

A. C. JOY
Advertising

R. G. LOGUE
Manufacturers

K. L. RATHBONE
Home Service

ZITA M. O'CONNOR
Women's Committee

CLYDE POTTER
Awards

The Gas Industry Exhibit at the Golden Gate International Exposition

A Voyage to Treasure Island

FORTUNATE indeed is the delegate to this month's Annual Convention of the Pacific Coast Gas Association, for when the busy convention day is finished he will find that his evenings are free and he may turn his thoughts toward an activity both mentally stimulating and soul inspiring—a visit to the Golden Gate International Exposition, a "Pageant of the Pacific" indeed, glistening by day or by night like a "magic city" from its jeweled setting on man-made Treasure Island in the azure blue of San Francisco Bay. Whether viewed from the $80,000,000 Bay Bridge or from the $35,000,000 steel arm which spans the Golden Gate; whether looked upon from one of San Francisco's famed seven hills or from the vantage points of Oakland or Berkeley, inspiration is certain to be felt by all who choose to see and to feel.

It is an ancient walled city, adapted to the breathless loom of the Bay Bridge towers by the 400-ft. Tower of the Sun, which stands in the spacious central Court of Honor. From it radiate phalanxes of exhibit palaces spaced by broad concourses — Court of the Seven Seas, Court of the Flowers, Court of Reflections, Court of the Moon, Court of Pacifica, Treasure Gardens.

The elephant, mammoth beast of pageantry, is a predominating decorative note, crowning the pyramidal entrance towers flanking the Portals of the Pacific. Statues, panels in relief, great murals and paintings glorify the courts and buildings. Standing calm and stupendous in the Court of Pacifica is Ralph Stackpole's colossal, 80-ft. statue, "Pacifica."

Here in this stupendous and dazzling setting the wondering visitor will find an almost endless number of attractions to please every conceivable taste.

There is the "Pacific Basin Area," a chain of colorful lagoons with the nations of the Pacific, housed in buildings of typical native architecture, clustered about them. (Here also many of the European exhibits are located.) There is the Hall of Air Transporportation, where the Clipper ships arrive and take off for the Orient or for many South American points of call.

The six distinct civilizations of the American Indian are dramatically presented as a part of the Federal exhibit. In the Recreational Building will be found a small theater, a hobby and craft exhibit room, junior museum, library and reading room, while nearby is the athletic stadium with facilities for outdoor sports. There is the $100,000 Temple of Religion beneath the great Tower of Peace, where creeds join in presenting religious displays and activities.

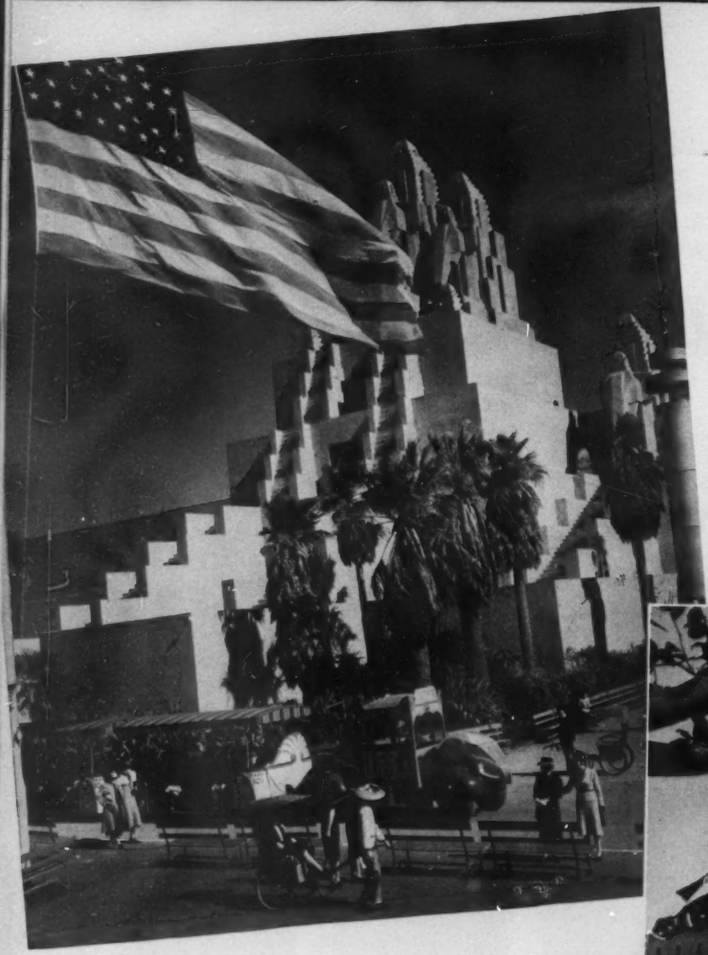
The Cavalcade of the Golden West, presented on a 300-ft. stage, is termed a super-pageant that portrays the exciting history of the development of the West from early explorations to modern times. "Oregon Wild Life," an exhibit of antelope, elk, deer, beavers and game birds in their natural environments of timber and marshes, is one of the most striking and instructive displays in the entire Exposition.

The art exhibit constitutes one of the most impressive attainments with which the Fair management is to be credited. It includes a remarkable collection of Old Masters from Europe,

On Treasure Island!

TO THE NORTH of the San Francisco-Oakland Bay bridge is gleaming Treasure Island. The aerial view above shows the unparalleled setting of the 1939 Golden Gate International Exposition. In the distance looms stately Golden Gate Bridge. In the bay formed by the man-made island anchor the Clipper Ships between trans-oceanic flights.

ONE OF THE TWO Elephant Towers standing at the Portals of the Pacific, main entrance to the Exposition. Shown (at left) are two of the most popular modes of getting about: the elephant train for mass transportation; and the ricksha—lifted bodily from Old Cathay, leg-motor and all. Palm trees, 80 feet high, lend typical California atmosphere.



IN THE COURT OF HONOR no scene is more stately than the one pictured at the right where the tall corridors of the Palace of Homes and Gardens stand. Rich foliage, overhanging branches and shaft-like flag poles lend much to the scenery. Gas is used in the model kitchens within the buildings.

prehistoric and modern arts of the Pacific, decorative arts, Japanese art treasures, contemporary paintings and other items with value beyond estimate. Music is represented by several bands, the San Francisco Symphony Orchestra, Stokowski's orchestra and choirs which perform daily.

A vivid picture of Western mining is demonstrated on a model mountain, 50 ft. high and 400 ft. long, in which there are working demonstrations of gold and all other types of mining that have helped to build the West. The industrial exhibit includes a gigantic million-dollar relief map of the 11 Western states. It is 100 ft. square, depicting dams, transmission lines, rail and highway lines, and natural resources in exact detail. More than 350 outstanding American industries are exhibiting at the Exposition.

The Gas Exhibit

Among all the many wonders to be seen at the Golden Gate International Exposition there is one which lies nearest the gas man's heart—the Gas Industry Exhibit, which houses the displays of 29 cooperating gas appliance manufacturers. What is the history of this exhibit? What has it accomplished? How has it been received?

It is estimated that some 8,000,000 people have visited the Exposition and that from 20 to 25 per cent of these pass through the Gas Industry Exhibit. And, according to P. C. G. A. Managing Director Clifford Johnstone, very few of those visiting the exhibit pass right through, but remain to browse around. The revolving stage show of seven all-gas kitchens requires 21 minutes, and the observation is that the average person remains for about half of it. It is felt by those in charge of the gas exhibit that those people interested in homes inspect the exhibit thoroughly. This fact is borne out by the large number of inquiries directed to the participating manufacturers and by the fact that many appliances have been sold as a result of people having seen them at the exhibit.

An important recent development affecting the gas industry is the All-Gas Sunshine House, sponsored by the San Francisco Chamber of Commerce, which will be dedicated on Labor Day.

But gas does a great deal more than just exhibit itself at the Golden Gate International Exposition. It is estimated that gas usage has been averaging about 8,000,000 cu. ft. per month. And what is it used for?

For one thing, it is doing the major share of the work required for the four big jobs—cooking, water heating, refrigeration, and space heating. It has found its way into 23 public restaurants, 66 food concessions; through straight forced air heating 10 buildings are made comfortable; 20 consumers are employing it for combination usage. In all there are some 152 consumers on 250 meters using gas at 60,000 cu. ft. per hour maximum.

Gas has proved its importance and usefulness to many of the exhibitors. The Kerr Glass Co. uses a CP range to demonstrate canning and preserving. Gas heats the water for the Junket exhibit; it warms the water and fires the kettle for See's candy; the snakes at the snake show loll about in water gas heated to the proper temperature.

Coca-Cola employs a 750 cu. ft. per hour gas steam boiler to generate steam to operate a bottling machine and a sterilizer. For heat only, Hills Bros. uses a large hot water heating system. At the Sunnyvale Packing Co. gas heats the water and fires six large soup kettles. At the Rex Import Co. a gas burner is used to demonstrate cooking pottery ware. Moulin, official photographer, turns on the gas to operate two film dryers.

But now that something has been told of the manner in which gas does its work on the Exposition grounds, it might be well to review the manner in which it traveled there. The gas passes through nearly five miles of steel pipe, including a submarine line, jointly installed by the Exposition and the Pacific Gas and Electric Co., being brought from the Key Route mole on the Oakland shore of the harbor to the southeast corner of the island under 10 lbs. per sq. in. pressure. It is estimated that some 57,000,000 cu. ft. will be consumed before the Fair closes on December 2, 1939.

Passing through a master meter before entering the Treasure Island distribution system, the gas is carried through 4-in. mains with branches along Exposition streets and avenues to 7 cross-connected loops. The system is composed of 5500 ft. of 4-in. pipe; 1000 ft. of 3-in. pipe; 5800 ft. of 2-in. pipe; 6700 ft. of 1½-in. pipe, and 6700 ft. of 1¼-in. pipe—a total of 25,700 ft.

Plug outlets for taps, 1¼ ins. in diameter, are spaced every 60 ft. along the distribution lines; meters and reducers, located just outside the consumer's premises, will measure the gas at pressures according to the individual requirement, generally about 6 oz. at the outlet.

Taps enter each of the main exhibit halls at strategic points, and exhibitors and concessionaires everywhere on the island are located over one of the loops. Standard threaded black steel pipe and cast iron fittings are used throughout the system, which is equipped with 13 shut-off valves.

Installation is in charge of W. P. Day, Exposition vice president and director of works, with William E. Leland acting as chief of the Division of Mechanical Engineering.

On these pages an attempt has been made to review briefly the wonders which the P. C. G. A. convention delegate may witness at the Golden Gate International Exposition and to relate in general the part that gas has played in making this World's Fair the achievement that it is. Literally, there are hundreds of exhibits of general interest and many of specific appeal. Should program duties interfere with Exposition visits much of the time, at least September 9, a day that has been set aside for the gas industry, will afford an opportunity for all to attend.

This is radiant Treasure Garden, jewel of the World's Fair isle in romantic San Francisco Bay. Immediately in the background is the rambling Yerba Buena Club, and behind it the Palace of Air Transportation. Gas is used in the kitchens of Yerba Buena Club.

Mansion or Cottage--

They're Both ALL-GAS in Houston

By W. H. TIPTON, Jr.

Advertising Manager,
Houston Natural Gas Company

NO matter what the citizens of Houston wanted to see in an "all-gas home"—mansion or cottage—they've had an opportunity to see both this spring. Houston Natural Gas Co. has cooperated with two real estate and building concerns this spring and early summer in showing homes fully equipped with natural gas appliances for the four big household jobs—cooking, water heating, refrigeration, and automatic heating.

Hugh Potter, president of River Oaks Corp., and one of the judges in the American Gas Association National Architectural Competition last year, was so impressed with the prize-winning plan of the home submitted by Alden Becker, Los Angeles architect, that he immediately made plans to have this home adapted to the River Oaks location and Houston climatic conditions, and build it as a River Oaks home. Adapted by Builder-Architect R. D. McCready from the original prize-winning plans of Mr. Becker, this all-gas home was built at 3404 Meadow Lake Lane in River Oaks. It was opened on March 22 with a private showing. Invitations were sent to approximately 5000 Houstonians to visit this home for the private showing, March 22-26, and many took advantage of the preview. On Sunday, March 26, the home was opened to the public and remained open each day through the following Sunday, April 2. Adequate newspaper advertising and publicity insured a large attendance at this demonstration all-gas home in its beautiful setting in River Oaks.

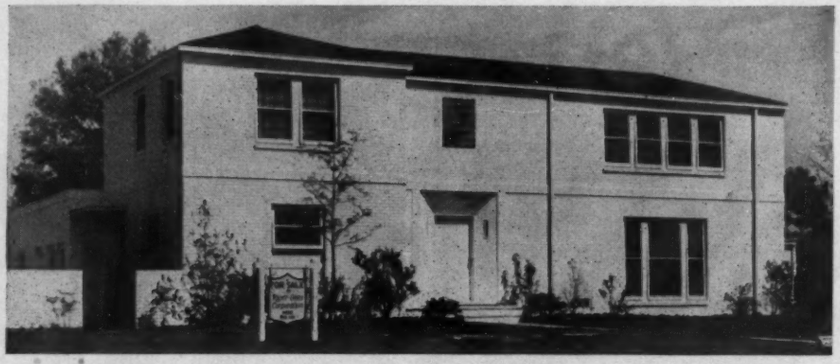
The outstanding characteristic of this home is its modernity. From the architectural use of planes in the different elevations to the indirect lighting, the house is as modern as New York's World of Tomorrow. Downstairs, just off the entrance hall, one finds a large living room, 15 ft. wide and 25 ft. long. Through French doors it opens on a screened porch as long as the living room. The dining room is spacious, and the unique use of glass brick on one of its walls attracted much comment. The kitchen, shining with a modern and attractive use of stainless steel, made a beautiful setting for the Magic Chef CP gas range and the K-1100 Servel Electrolux gas refrigerator. The cushioned bench and breakfast table add to the kitchen's livability. The maid's room and bath, a powder room, a closeted approach to the Payne gas furnace in its own special pit, and the two-car garage, with a large storage-type EverHot gas water heater, completed the downstairs complement of rooms.

Upstairs are three commodious bedrooms, two handsomely appointed baths and seven big closets. The roof of the garage has been made into a deck for sun-bathing, and just outside the master bedroom is an upstairs sleeping porch the same roomy size as its downstairs counterpart. The home is priced at $17,500, including the over-size lot one block in depth.

Those who felt that the cottage was more in keeping with their pocketbook had their opportunity to see a demonstration all-gas home when the "All-Gas Conversing Home" was opened to the public on June 11. This time, Houston Natural Gas Co. joined with W. E. White, developer of Pershing Place, Houston subdivision, in a promotion. A seven-room Colonial bungalow, priced in the $6000 class, including lot, was built, and through an arrangement with the Mid-South Talking Homes Co. this home was demonstrated as an all-gas "conversing home," which talked and answered questions of visitors in an entertaining and educational manner through the medium of unseen lecturers and sound equipment. Each salient feature of the home, including the gas appliances, was dramatically presented by the mysterious voices that seemed to come from the appliances, the furnishings or the walls themselves. The home was shown completely furnished through an arrangement with one of the local furniture stores. Gas appliances installed in the home were the K-800 Servel Electrolux gas refrigerator, the Estate CP gas range, Sandy Mac automatic storage-type gas water heater, and Fox Sunbeam gas floor furnaces with automatic clock control.

The Houston Chronicle joined with the builder and the gas company in promoting the "All-Gas Conversing Home" with special feature stories and a generous advertising section on Sunday, June 11. Over 8000 persons visited the home on Sunday afternoon and evening, June 11, and thousands more had visited the home by Thursday evening, June 15, when the public demonstration ended.

With these two demonstration all-gas homes which it has helped sponsor in Houston this year, Houston Natural Gas Co. feels that it has done its share in promoting the national all-gas home program. In a city where home building is booming, these demonstration all-gas homes have given thousands of potential home builders an insight into the important role that gas appliances play in helping with the four big household jobs, whether in a stately mansion or a homey cottage.



This all-gas home, built in the River Oaks district in Houston, was modeled on the prize-winning plans of Architect Alden Becker, 1938 winner of the A. G.A. National Architectural Competition. A CP range is used in the kitchen.

TABLE NO. 1. DATA FOR LABORATORY TEST OF CATHODIC PROTECTION OF BARE STEEL COUPONS IN SALT WATER (3% NaCl)

Test	Sample No.	Status	Length of test days	Unit weight loss mg/cm²/year	Ratio of unit weight losses of undrained sample to drained sample	Potential of sample referred to rusty iron*, volts—at end of test	Density of current drained from sample, M.A./sq. ft. at end of test
A	1	Drained	55	0.8	63	0.470	8.75
	2	Drained	55	0.6	84	0.432	12.4
	3	Drained	55	1.3	40	0.395	7.12
	4	Undrained	55	52.1	....	0.000	0.00
B	1	Drained	20	0.0	Infinite	0.478	15.9
	2	Drained	20	12.6	4.2	0.041	8.46
	3	Drained	20	6.2	8.4	0.144	8.85
	4	Undrained	20	52.6	....	0.000	0.00
C	1	Drained	49	0.1	470	0.344	12.2
	2	Drained	49	0.5	70	0.363	25.2
	3	Drained	49	1.5	24	0.496	111
	4	Undrained	49	37.7	....	0.000	0.00

Dimensions of coupons = 1.5 x 0.5 x 0.0625 in.
*Undrained sample was used for rusty iron in jar 1, which contained samples 1 and 4.

Current and Voltage Needs for the Cathodic Protection of Steel Submarine Pipe Lines

• **HARRY J. KEELING, Southern Counties Gas Co., Los Angeles, Calif., in a paper, "Current and Voltage Requirements for the Cathodic Protection of Bare Steel in Salt Water," to be presented before the Forty-sixth Annual Convention of the Pacific Coast Gas Association to be held in San Francisco, Calif., September 6-9, 1939.—(Abstract by G A S.)**

THE potential drop between pipe and surrounding earth necessary for cathodic protection has been given as between 0.2 and 0.3 volts by various investigators; however, no published data could be found which would give the corresponding potential requirements for the protection of iron in sea water. As a result of the pipe coating inspection recently made on the cathodically protected Cerritos Channel pipe line crossing of the Southern Counties Gas Co., steps were taken immediately to replace the gravity battery with a rectifier which would permit draining more current, and field and laboratory investigations were started to determine the minimum potential necessary for the protection of bare steel immersed in salt water to guide the operation of the drainage station on the channel crossing. This report is a résumé of the results of our investigation.

H. J. KEELING

The field tests were conducted by installing 2x5-in. weighed bare steel coupons in the ocean at the pipe line crossing. Two of these samples were connected by rubber-covered wires to the drained underwater pipe line. One sample was left undrained as a control. The coupons were installed about 100 ft. from the shore, and arranged as shown in Fig. 1. A drained sample was located on each side of the pipe so as to show whether there was any difference in the protection received by the side of the pipe nearest the ground electrode and the side opposite the ground electrode.

The first set of coupons was removed, cleaned, and weighed after the elapse of only two months in order to show as soon as possible whether the pipe line was receiving sufficient protection. The drained samples were covered with an outer shell of hard sand and calcified matter. The material next to the metal was soft, however, and the metal was bright, with the exception of a few brown discolorations. There was no pitting or other sign of corrosion. The undrained control samples were covered with a fairly uniform covering of rust, and a few patches of hard blistery material. They did not have the coating of hardened cement-like sand and aggregate found on the drained samples. The cleaned samples were rough, and uniformly covered with shallow pits.

The comparative unit weight loss of the drained and undrained samples indicated that the submarine crossing was adequately drained. The sample on the side of the pipe nearest the ground electrode lost about only two-thirds of the weight of the sample located on the opposite side. However, it is believed that this is probably due to experimental error, rather than to any difference due to location, since the unit weight loss was practically of the same magnitude as the experimental error in weighing and cleaning the samples.

A second set of samples was installed and left in place 128 days. Unfortunately, only one of these samples was recovered. However, the unit weight loss of the recovered sample, No. 48, agreed quite well with the first set of samples.

A third set of coupons was installed, occupying approximately the same positions as the first two sets. After an elapse of 129 days, this third set of samples was removed, cleaned, and weighed. The condition of the samples was identical with the first set. The unit weight loss of this set of samples agreed quite well with the previous results.

A summary of the results of these field tests using the three sets of corrosion test samples installed in the ocean is shown in Table No. 2 on the following page.

Simultaneously with the field tests, an investigation was started in the lab-

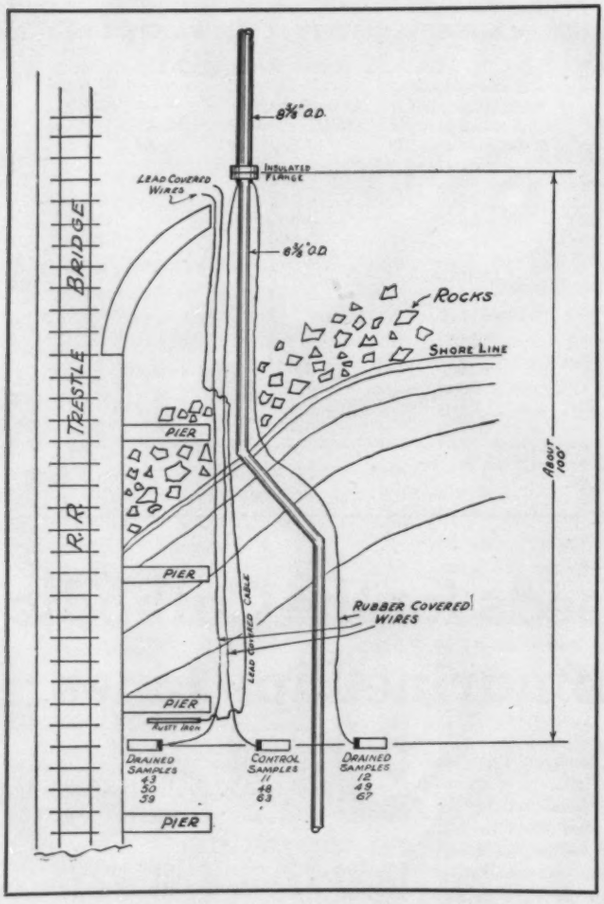


FIG. 1

Arrangement of test coupons in ocean at Cerritos Channel submarine crossing to Terminal Island.

oratory to determine, with more precision, the minimum potential that might be safely maintained on the underwater pipe line without losing metal. After several preliminary trials, the laboratory procedure finally adopted was as follows:

Weighed steel coupons were arranged in three glass jars, each holding about one gallon of 3 per cent sodium chloride solution. Three coupons were drained and one left undrained for a control. Carbon rods in the upper part of the jars were used as anodes. The drained sample was turned so that its edge pointed toward the anode so that the current density from the face of the sample would be as nearly uniform as possible. The current drained from the samples was determined by measuring the potential drop across 100 ohm resistors connected permanently in series with the samples. All potential measurements were made with a potentiometer so that no corrections would be necessary because of instrument current. Rusty iron rods on the bottom of the jars were used in determining the potential of the drained samples. In one jar, the undrained coupon was used as a rusty iron reference electrode.

Before adopting the final arrangement of the samples in the jars, tests were made with different arrangements of the various components, to be sure that the undrained control coupon would not be anodic due to the current discharged from the carbon anode. It was found that by using small coupons in a fairly large jar, putting the anode and cathode near the top, and the undrained sample and rusty iron electrode on the bottom and insulating the rusty iron connection which passes upward through the solution, the potential of the undrained control sample would not be affected by the drainage current. With this arrangement of the equipment, the results as found by the laboratory tests should apply directly to field conditions tested by our customary methods. Complete data for the laboratory tests is shown in Table No. 1.

The tentative conclusions drawn from the tests to date are as follows:

1. The average potential required for the complete cathodic protection of bare steel in sea water is about 0.5 volts referred to well-rusted iron immersed in the water, with possible extreme values of about 0.35 to 0.7 volts.

2. The average unit current density required for the complete cathodic protection of bare steel in sea water is about 15 milliamperes per square foot, with possible extreme values of 7 to 25 milliamperes per square foot.

3. A bare steel surface receiving cathodic protection in sea water becomes coated with a fairly hard salt which gradually reduces the current density necessary for complete protection.

TABLE NO. 2

Drained Sample No.	*Unit Wt. Loss mg./sq. cm./year*	*Undrained Sample No.*	*Unit Weight Loss mg./sq. cm./year*
11	1.8	43	130.6
12	2.6	59	89.6
48	1.8		
63	1.5		
67	1.2		

Drained samples, average loss, 1.8; undrained samples, average loss, 110.1.

Average unit weight loss ratio, undrained to drained samples = 62.2.

Average potential of drained samples cathodic to rusty iron in water = 0.65 volts.

Average potential of undrained samples cathodic to rusty iron in water = 0.03 volts.

Gas Permits Required for International Operations

With the intended purpose to expedite and centralize the issuance of Presidential permits for the construction and operation of pipe lines carrying gas to or from foreign countries, more particularly Canada and Mexico, President Roosevelt has, by Executive Order No. 8202, directed that, first, permits must be issued and, second, that these should have the approval of the Federal Power Commission, subject to the advice of the State and War Departments.

Heretofore, under the Federal Power Act, it has been necessary for gas and electric companies to get authorizations for international operations, but there was no specific provision for the issuance of permits. These must now be obtained through the Federal Power Commission.

A temporary order has already been issued extending to September 30 the authorizations to power and gas companies, and at that time definite action will be taken by the President upon the recommendations of the Commission.

Chicago Gas Main Yields Records 46 Years Old

Records dating back 46 years to 1892 were found recently in one of Chicago's gas mains when a street mechanic took up a section of the main for repair. The cast iron pipe had been laid in 1892 by the old Chicago Economic Fuel Gas Co., and in some way a number of the company's delivery memoranda had been tucked into one of the pipes. The papers were discolored with age, but all were legible, according to a story appearing in the July issue of *Cast Iron Pipe News*.

Manley, Iowa, Now Has Gas

Natural gas has recently been turned into the mains in the town of Manley, Iowa, by the Peoples Gas and Electric Co., of Mason City, Iowa. The event was observed by a ceremony in which Mayor Schulte turned the valve letting the gas into the mains. T. L. Connor, superintendent of the gas company, also took part in the ceremony.

Indiana Utility Hits Gas

The third large natural gas well in less than two years was brought in recently by the Indiana Utilities Corp., Corydon, Ind., one mile from the city. The well, which flows 100,000 cu. ft. per day, has been sealed for future use, making the company's total future supply approximately 400,000 cu. ft.

Natural Gas in California—Its Supply and Production—1906 to 1939

• **ROY M. BAUER, gas supply supervisor, Southern California and Southern Counties Gas Companies, Los Angeles, Calif., in a paper, "Natural Gas Production and Supply in California, 1906-1939," to be presented before the 46th Annual Convention of the Pacific Coast Gas Association, San Francisco, Calif., September 6-9, 1939.—(Abstract by G A S.)**

IN order to present a monthly graphical picture of the production and utilization of natural gas in California from 1930 (the inception of official State records) to date, Fig. 1 was prepared. Starting with 1935 it was possible to segregate the net sales to gas companies, and an additional curve has been added to the graph.

R. M. BAUER

The first productive oil well in California was completed in Pico Canyon, near Newhall, in 1870. Although some natural gas was used for commercial purposes as early as 1894, it was not until 1908 that a utility company entered the field and natural gas resale commenced. From that date to the present the industry has taken tremendous strides, until today the value of the natural gas produced ranks third among the mineral products of the state, being exceeded only by production of gold and of oil.

Casinghead gas as it comes from the well is saturated with gasoline. This is removed before the gas is delivered to the pipe line companies. Table No. 1 gives fractional gas analyses on "dry" casinghead gas and dry gas. Due to its ethane and higher hydrocarbon percentages casinghead gas is slightly higher in heating value than the dry gas which is predominantly methane.

A large and stable natural gas reserve is, of course, a first essential of a natural gas company. In 1913 the first large natural gas deliveries came from a few wells in one field, Buena Vista Hills. Today the California natural gas utilities of the State receive their natural gas supply from many thousands of gas and oil wells in four Central California fields, 18 south San Joaquin Valley fields, 10 Coastal fields and 17 Los Angeles Basin fields. Exploration has been extensive in the last few years and there has been wildcatting throughout the State. Since July, 1937, there have been eight new gas and oil fields discovered, and in existing fields deeper zones have been reached and extensions made in the producing limits.

From time to time there have been estimates of the natural gas reserves. One of the more recent was prepared by Ralph E. Davis, who made an extensive analysis of California production and geological data. (See *G A S*, May, 1938, p. 29.) As of January 1, 1938, he estimated the gas reserves of the State to be produced in present known fields for all purposes at 6.9 trillion cu. ft. The current withdrawal is about 350 billion cu. ft. yearly, which is somewhat less than the increases from newly developed reserves.

There were tremendous wastages of gas during the early periods of production, particularly during the two eras of town lot development (1922-24, 1928-30). This unconserved gas has been greatly reduced, and since 1931 has averaged less than 10 per cent of that produced. To bring this

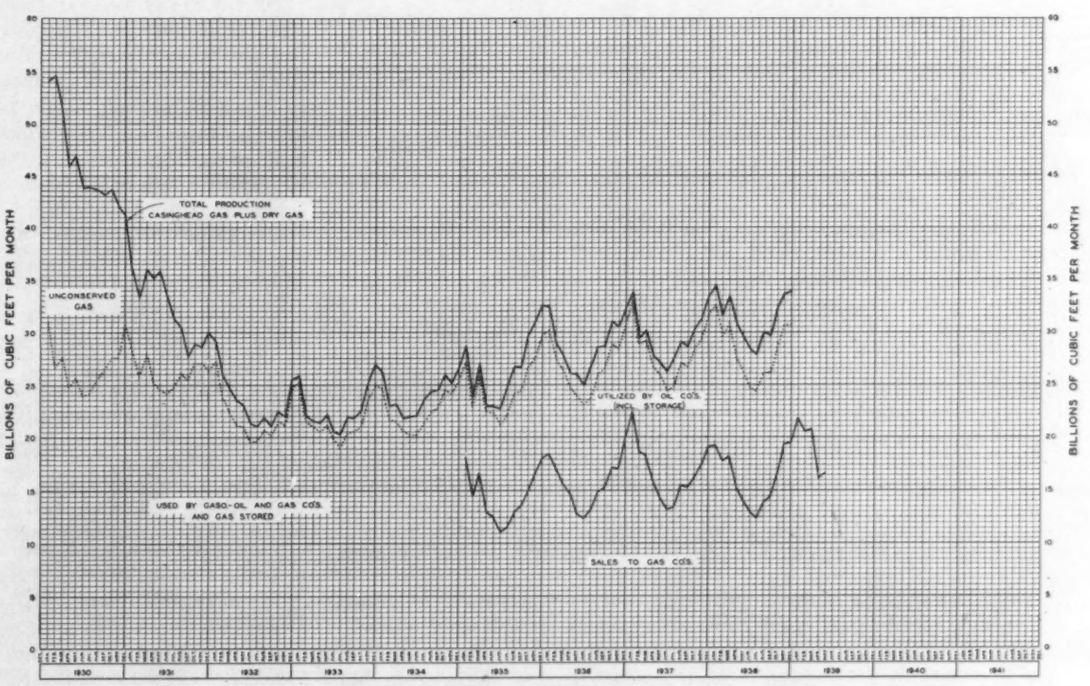
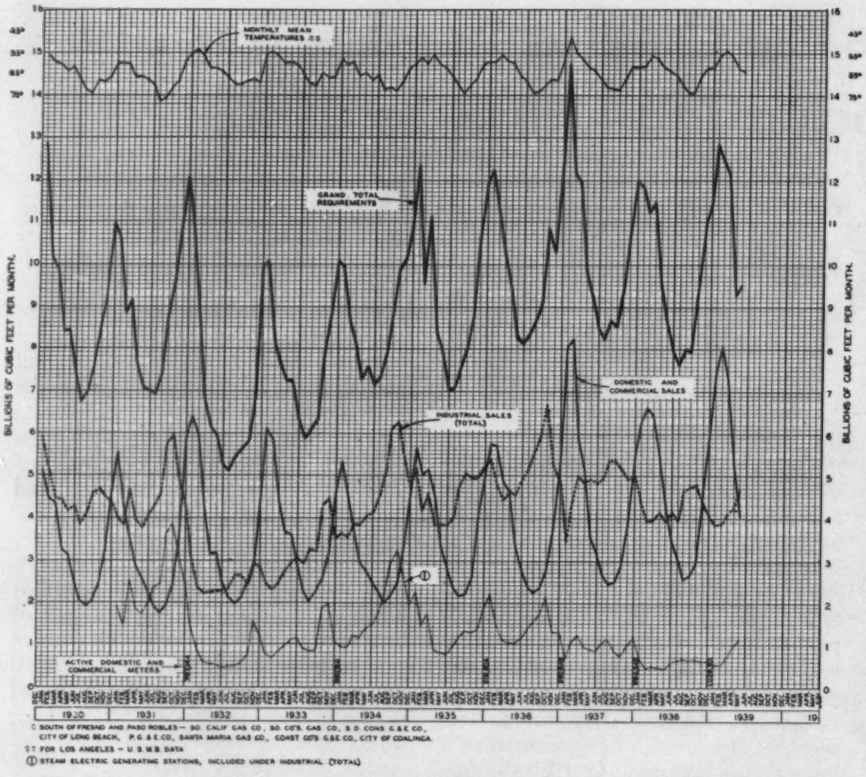


FIG. 1. Monthly natural gas production and utilization in the State of California (from the official records of the State Department of Natural Resources — Division of Oil and Gas).



① SOUTH OF FRESNO AND PASO ROBLES — SO. CALIF. GAS CO., SO. COTS. GAS CO., S.D. CONS. G.E.& E. CO., CITY OF LONG BEACH, P.G.& E. CO., SANTA MARIA GAS CO., COAST CNTS. G.E.& E. CO., CITY OF COALINGA.

② FOR LOS ANGELES — U.S.W.B. DATA

③ STEAM ELECTRIC GENERATING STATIONS, INCLUDED UNDER INDUSTRIAL (TOTAL)

FIG. 2. Natural gas sales, company use, and unaccounted-for gas (companies operating in Southern California).

TABLE NO. 1. GAS ANALYSES

Sample from kind of gas	*North Dome Kettleman Hills C.H. (Temblor)*	*North Belridge C.H. (Wagon-wheel)*	*Ten Sections C.H.*	*Rio Bravo C.H.*	*Semi Tropic Dry*	*Rio Vista Dry*
CO_2	.....%	1.30%	0.50%	0.50%	0.1 %	.....%
CH_4	85.36	91.21	87.97	83.32	98.7	94.79
C_2H_6	8.62	3.61	8.05	10.31	0.0	2.82
C_3H_8	5.10	1.94	3.14	5.41	.....	0.72
Iso-C_4H_{10}	0.44	0.36	0.16	0.36	.....	0.17
N-C_4H_{10}	0.48	0.69	0.16	0.10	.....	.....
C_5H_{12}	.....	0.89	0.02	.....	.....	.....
N_2	.....	.....	.....	.....	1.2	1.50
Calc. B.t.u.	1173	1089	1118	1174	992	1030

Sample from kind of gas	*Coyote Hills C.H.*	*Dominguez C.H.*	*Long Beach C.H.*	*Santa Fe Springs C.H.*	*Wilmington C.H.*	*Ventura Avenue C.H.*
CO_2	.....%	0.91%	0.50%	0.40%	3.00%	0.40%
CH_4	85.4	89.42	86.76	85.09	88.92	89.13
C_2H_6	8.0	6.05	7.19	10.23	4.27	4.90
C_3H_8	5.5	2.95	4.28	4.15	3.42	4.63
Iso-C_4H_{10}	0.6	0.36	0.66	0.08	0.25	0.51
N-C_4H_{10}	0.5	0.28	0.61	0.05	0.14	0.43
C_5H_{12}	.....	0.03	.....	.....	.....	.....
Calc. B.t.u.	1178	1105	1152	1187	1057	1134

about, several contributing factors have been favorably at work. There has been cooperation among producers in prorating and curtailing production, natural decline in some fields has tended to cause all available gas in these fields to be used, there has been storage of gas in depleted sands, and there has been the passage and enforcement of a State gas conservation act.

During recent years there has been an improvement in well drilling technique which has made it possible to reach greater depths. Whereas a few years ago producing wells at 10,500 ft. were unknown, some fields are now actually producing at 11,500 and 13,200 ft. In 1938 one well was drilled in the Wasco field to 15,004 ft., which, it is believed, is still a world's record.

To the Santa Maria Gas Co. goes the honor of being the first utility company in the State to commence domestic service with natural gas, in 1907. Three years later the California Natural Gas Co. laid a pipe line to Bakersfield and distributed the natural gas available from the Buena Vista Hills field. Large volumes of gas were developed in this field, and in 1912-13 a 12¾-in. pipe line was laid over the Tehachapi Mountains to Los Angeles, a sizable undertaking in those days. April 28, 1913, marked the delivery of the first natural gas to Los Angeles and vicinity.

During 1914 developments in the eastern portion of the Los Angeles Basin reached the point where natural gas was available to adjacent communities. In December, 1915, the first Basin gas, from West Coyote field, was delivered to Los Angeles. In 1921-22 Santa Fe Springs, Long Beach and Huntington Beach, and later Dominguez, Ventura Avenue, Kettleman Hills and North Belridge fields were developed. Transmission lines were laid to tap these sources and market expansion took place.

It was the development of the great Kettleman Hills gas and oil field in 1928 and 1929 that enabled the Pacific Gas and Electric Co. to distribute natural gas in the San Francisco Bay Region in August, 1929.

To illustrate the variation in seasonal load and the effect of weather and temperature on the domestic demand, Fig. 2 has been prepared. Southern California data have been used because available over a longer period of time, and also there is somewhat more seasonal domestic load variation in Southern California. Steam electric generating plant usage varies with rainfall conditions; this curve was included in order to explain some of the industrial sales variations.

■ ■

J. F. Weedon, Former Advertising Head, Dies

John F. Weedon, 71, former advertising manager of The Peoples Gas Light and Coke Co., Chicago, died recently in his home in Wilmette, Ill. Mr. Weedon retired in 1933, having served the company nearly 44 years.

In 1913 Mr. Weedon started the company's employes' magazine, *The Peoples Gas Club News*, becoming its first editor. In 1919 he originated the *Peoples Gas Gazette*, a publication mailed with gas bills to customers, which became the model for similar publications throughout the country. He was active in publicity and advertising work for the A.G.A. and for the Public Utilities Advertising Association.

Operating Costs of Gas-Fired Air Conditioning Systems

• J. A. HILL, Pacific Gas and Electric Co., San Francisco, Calif., in a paper, "Operation Costs of Gas-fired Air Conditioning Systems," to be presented before the 46th Annual Convention of the Pacific Coast Gas Association, San Francisco, Calif., September 6-9, 1939.—(Abstract by G A S.)

EARLY in 1937 the management gave approval for the installation of a gas-fired winter and summer air conditioning system to be installed in the Modesto office building of the Pacific Gas and Electric Co. The equipment installed was manufactured by the Williams Air-o-matic Heating Corp. of Bloomington, Ill. It is known as the Williams Air-o-matic Air Conditioning System. The summer cooling is accomplished by direct expansion refrigeration produced in an absorption machine. The winter heating is accomplished by means of a fan, blowing air over steam coils and introducing this air through the same duct system which carries the cooling air in the summer time. Steam for utilization in the winter heating coils, or the refrigeration machine, is produced by a gas-fired Bryant low pressure heating boiler.

J. A. HILL

The consumption of gas, electricity and water used during the heating and cooling seasons of 1938 was metered through separate meters. In addition, daily wet and dry temperatures were recorded of the outside air and inside conditions in the working space. During the winter months the inside temperatures averaged 71° to 73° dry bulb and 54° to 60° wet bulb temperatures. During the summer period the interior temperatures range from 76° to 82° at dry bulb with wet bulb temperatures from 64° to 68°. These temperatures seem to be satisfactory to those working in the building.

Fig. 1 shows the monthly M c.f consumption of gas divided between that used for heating and that used for cooling.

In Fig. 2 is given the monthly cost of heating and cooling during the winter and summer season, including gas, electricity and water. These costs are at customer rates without any reduction.

The total gas consumption during the winter months amounted to 92,500 cu. ft. resulting in a cost of $90.08. The summer consumption of gas for cooling was 288,900 cu. ft., resulting in a cost of $97.39.

While the plant at Modesto was a 10-ton installation, the actual load on the plant was nearer nine tons, giving a consumption of gas per ton of refrigeration load per season of approximately 32,100 cu. ft.

During the entire season no trouble of any consequence developed in the operation of this plant. There was some scaling on the coils in the evaporative condenser but this was not serious and was easily corrected.

At about the same time that the air conditioning system was installed in the Modesto office building, a steam jet vacuum cooling system was installed in the Sacramento office building. The chilling plant of 25 tons refrigeration capacity was purchased from the Ross Heater and Manufacturing Co. of Buffalo, N. Y.

In order to furnish adequate condenser water for this plant, the existing well in the basement of the Sacramento office building was cleaned out and a new deep-well pump installed. A test on this well indicated availability of 400 gals. of water per minute with a water temperature of 62°F. It was decided to use this water for pre-cooling of the air circulated through the building before the water was used in the condenser of the chilling plant. In order to dispose of this quantity of water which could not be piped into the City sewer system, a disposal well was drilled under the sidewalk in a diagonally opposite corner of the building basement. The chilling plant was arranged to use low-pressure steam (15 lbs. gage) from the existing Bryant gas-fired boiler which supplies steam to the direct cast iron radiator heating system for winter heating.

After the equipment was started up and had been properly adjusted to handle the load and give the results desired, it was running under the following conditions:

1. Steam pressure on the jets ..... 15 lbs. gage
2. Well water temperature ..... 62° F.
3. Return water from pre-cooling coils into condenser ..... 66° F.
4. Condenser water out of condenser to disposal well ..... 88° F.
5. Chilled water from chilling tank into cooling coils ..... 50° F.
6. Chilled water returning from coils to chilling tank ..... 55° F.

With this arrangement in operation, the total refrigeration tonnage necessary to cool the building was divided as follows:

1. Pre-cooling ..... 15 tons
2. Chilled-water cooling ..... 25 tons

The equipment was arranged so that the consumption of gas and electricity

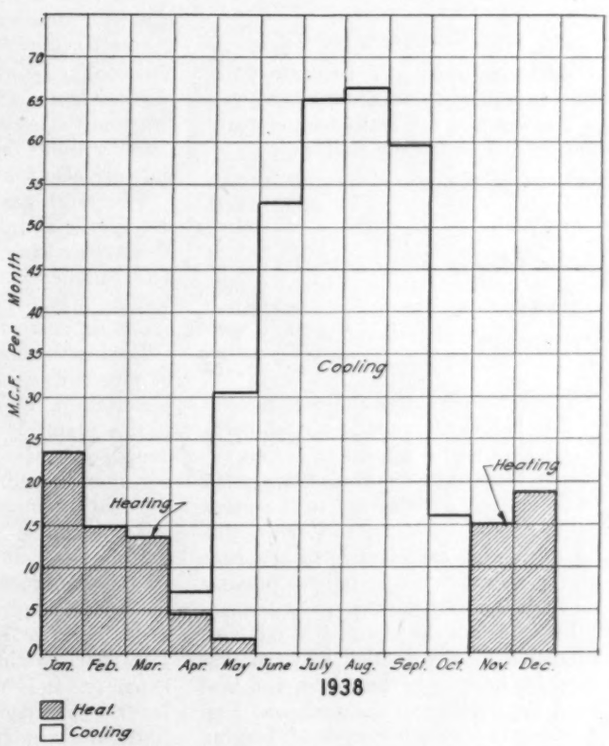
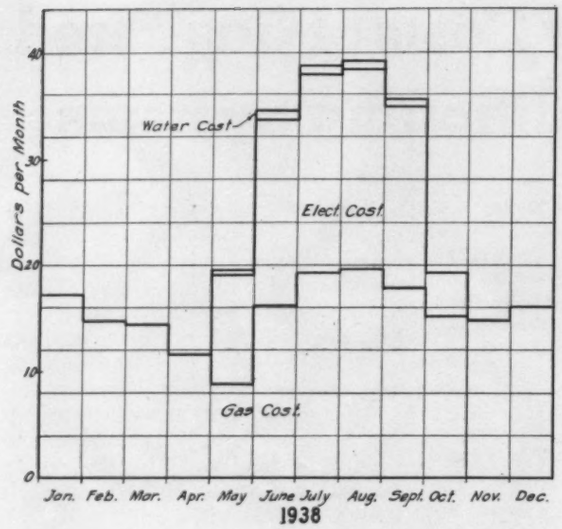
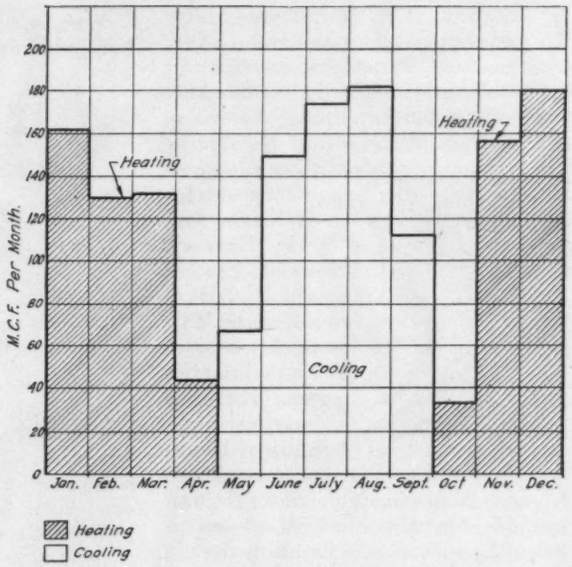


FIG. 1.
Gas consumption for heating and cooling Modesto office building.





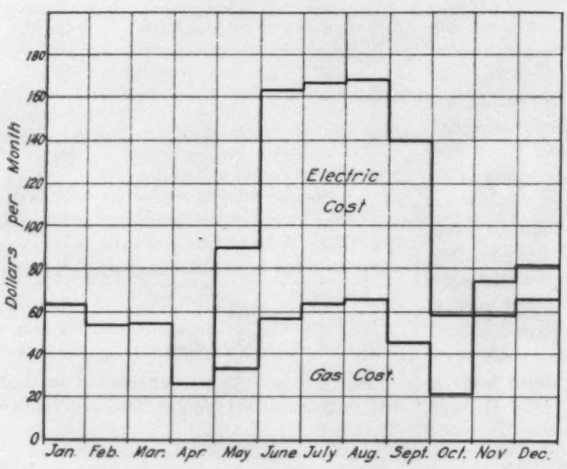


FIG. 2 (above, left): **Cost of heating and cooling Modesto office building.**

FIG. 3 (above, right): **Gas consumption for heating and cooling Sacramento office building.**

FIG. 4 (at left): **Cost of heating and cooling of Sacramento office building.**

could be metered and accurate daily records kept of these quantities as well as the wet and dry bulb temperatures outside and inside the building.

Outside temperature	102° F. dry
	75° F. wet
First floor	82° F. dry
	68° F. wet
Second floor	82° F. dry
	68° F. wet
Third floor	82° F. dry
	68° F. wet
Fourth floor	82° F. dry
	68° F. wet

These temperatures indicate a drop of 20° below the outside air temperature. This would appear to be an excessive drop in temperature but seemed to be entirely satisfactory to the occupants of the building and there was no particular criticism from the general public continually passing through the first floor.

Fig. 3 shows the monthly M c.f. consumption of gas divided between that used for heating in the winter and that used for cooling in the summer. Fig. 4 gives the monthly cost of heating and cooling, showing both the gas and electric costs, accumulative one upon the other. These costs are at customer rates without any reduction. These data are also for the year 1938.

The total gas consumption during the winter months amounted to 842.3 M c.f., resulting in a cost of $347.02. The summer consumption of gas for cooling was 688 M c.f. with a corresponding cost of $267.28.

During the entire season, no trouble of any consequence developed in the installation, adjustment or operation of this plant. It is the opinion of most people acquainted with air conditioning that the conditions prevailing in the Sacramento office building during the summer period are ideal.

It is felt that the cost of operation of this plant is not much, if any, below the corresponding cost of operation of an electric motor-driven compression refrigeration plant of the same capacity. It is well known that steam jet vacuum cooling systems are not particularly adaptable nor economical in operation, in sizes over 50 tons of refrigeration capacity; however, it was decided to make this installation at Sacramento because it was one of the larger P. G. and E. office buildings and offered the only opportunity for the installation of a system of this type. This accounts for the large consumption of electricity to operate the auxiliary pumps in connection with the plant; however, the results obtained do indicate a very desirable consumption of gas during the summer period when transmission and distribution lines have ample capacity available.

■ ■

Two Companies Purchased By New England G. & E.

R. J. Rutherford, vice president of Worcester (Mass.) Gas Light Co., has recently announced the purchase of the Milford (Mass.) Gas Light Co., and the Marlborough (Mass.) Hudson Gas Co. by the New England Gas and Electric Association, Cambridge, Mass., owner of the Worcester company. The two companies were formerly owned by the New England Power Association, Boston, and together have a total of about 6300 customers.

The purchase will not affect the companies' operations nor require any additional construction.

■ ■

Hope Natural Gas Co. Will Move To Clarksburg, W. Va.

The Hope Natural Gas Co., now located at Pittsburgh, Pa., will move its headquarters next spring to Clarksburg, W. Va., it has been announced by L. L. Tonkin, president. The company has been at Pittsburgh for 37 years.

■ ■

Gas Radio Seen In New Home

A gas radio, shown and operated for the first time in the United States, was one of the main features of the Oklahoma Natural Gas Co.'s all-gas home at Tulsa, Okla., which was entered in the A.G.A. home-building contest. This radio was imported from England.

Control of Cooling Tower Algae with Chlorine Gas

• **T. C. WALLACE, Southern Counties Gas Co., Los Angeles, Calif., in a paper, "The Use of Chlorine Gas for Algae Control in Cooling Towers," to be presented before the 46th Annual Convention of the Pacific Coast Gas Association to be held in San Francisco, Calif., September 6-9, 1939.— (Abstract by G A S.)**

PREVIOUS reports on the control of algæ, as well as experimental work leading to those reports, followed to a certain extent published information derived from the chlorine treatment of swimming pools and city domestic water supplies, as applied to our own situation. Because of danger of corrosion, we set up a maximum concentration of 10 P.P.M. and endeavored to work out an application economical, simple and effective.

Prior to the time of the 1937 report[1] the concentration limit of 10 P.P.M. was observed, and the time required for injection of the chlorine gas in sufficient quantities to reach that concentration was reduced to 30 minutes.

That treatment was later found to be inadequate because of the apparent ability of the algæ to build up a resistance to the chlorine. It had been noted that the chlorine gas was practically all dissipated within an hour after the injection was stopped. It was also observed that the algæ was being gradually diminished in quantities for a certain period, following which it began to build up. No signs of corrosion were noted to any metal parts.

Concentration Increased

It was then decided to increase the concentration of the chlorine gas in the cooling tower water to a maximum of 15 P.P.M., or even slightly higher. It was thought that this increased concentration would be dissipated before the metal parts of the circulating system were attacked by the chlorine gas, if the injection period was considerably reduced by increasing the rate. It was believed that this increased concentration would be severe enough to kill the algæ growth before it could build up a resistance to the treatment.

Such was found to be the case when the trial was made. The rate of injection was increased until only eight minutes were required in which to reach the desired concentration. In a day or so following the trial the algæ growth lost its green color and began to fall away from the cooling tower structure. Corrosion test coupons were found to be unaffected by the higher concentration for such brief periods; also due to the variant speed of the water in the cooling tower, an average concentration of only about one-half of the maximum was obtained.

This experiment was carried on in a cooling tower at the Ventura compressor plant of the Southern Counties Gas Co. This particular tower has a capacity of 40,000 to 50,000 gals. of water which circulates at the rate of 3000 G.P.M. This faster rate of injection so far exceeded the rate of dissipation that less chlorine gas was required per thousand gallons of water than was required at the 30-minute, or slower, injection rates. Also, it should be stated that high wind velocity through the tower at the time of injection increases the rate of dissipation and results in the loss of much chlorine gas. Windy periods, therefore, are avoided when making injections of chlorine.

In the 8-minute injection period mentioned we found that we could set up a rule which could be followed with set results, that is, 1/5 lb. would chlorinate 1000 gals. of water. The injection rate is 1 lb. of chlorine per minute, or 8 lbs. per injection in our particular case, as compared to the 30-minute period of 12½ lbs. per injection with a maximum of 10 P.P.M.

However, to begin with a tower which has not been treated for algæ, and which is heavily loaded with algæ growth, the use of the faster injection rate of 1 lb. per minute may need to be continued for as much as two hours on the first treatment in order to reach a chlorine concentration of 10 P.P.M. Succeeding treatment periods will become shorter and shorter until a minimum period is reached. Usually three or four weekly treatments will suffice for this end. Such cases were observed at other plants in the Ventura District.

After the minimum injection period of 8 minutes was reached in the Southern Counties Gas Co.'s tower, and weekly treatments had been continued for about two months, it was noticed that the algæ growth began to increase, accompanied by a sharp increase in the amount of chlorine required to reach the desired concentration. The period was extended from 8 minutes to beyond a 10-minute injection period. This indicated that the algæ growth was building up a resistance to the treatment. While it is generally believed that there is no one treatment that can continually control algæ, it was decided to try a bi-weekly chlorine treatment to see what the result would be. It was found that after treating bi-weekly for two weeks, the injection period could be reduced to the normal period of 8 minutes, and weekly periods again resumed. This procedure has been in effect and working satisfactorily for the past several months.

Weekly Applications

At present it is an established practice at the Southern Counties Gas Co.'s plant to apply weekly chlorine gas treatments at an injection rate of 1 lb. per minute, allowing 1/5 lb. for each 1000 gals. of water. Whenever the injection period exceeds the normal period by 25 per cent, bi-weekly treatments are started and continued until the normal period is again reached.

The apparatus used is that described in the 1937 report, namely, a commercial tank of chlorine gas, a differential U-tube of glass with a built-in orifice calculated to give the desired volume flow per minute, and small copper tubing to connect the inlet valve on suction line of circulating pump.

To test for chlorine concentration use ortho-tolidine as an indicator. It is made up by using 1 c.c. of ortho-tolidine in 100 c.c. of a 10 per cent hydrochloric acid solution. Four c.c. of this indicator is used in a 100 c.c. water sample. For 10 P.P.M. chlorine gas concentration a dark brown color appears; for 15 P.P.M. the color is red.

1. Volume 28, page 103, "Proceedings of the Pacific Coast Gas Association, 1937."

CALENDAR

September

Gas Industry Day — Golden Gate Exposition, San Francisco, September 9.

Pacific Coast Gas Association — 46th Annual Convention, Fairmont Hotel, San Francisco, Calif., September 6-9.

West Virginia Oil and Natural Gas Association Convention — Charleston, W. Va., September 27, 28.

Wisconsin Utilities Association, Accounting Section—Plankinton Hotel, Milwaukee, Wis., September 21, 22.

October

American Gas Association — 21st Annual Convention, New York City, October 9-12.

Empire State Gas and Electric Association — Annual Convention, Westchester Country Club, Westchester, N. Y., October 19-20.

Gas Industry Day — New York World's Fair, October 9.

Midwest Industrial Gas Sales Council — Palmer House, Chicago, October 26.

National Metal Congress and Exposition — Chicago, October 23.

National Safety Council — Atlantic City, N. J., October 16-20.

The Separation of Dust By Centrifugal Force

• FRANK WILLS, Pacific Gas and Electric Co., San Francisco, Calif., in a paper, "Separation of Dust from Gases by Centrifugal Force," to be presented before the Forty-sixth Annual Convention of the Pacific Coast Gas Association, to be held in San Francisco, September 6-9, 1939.— (Abstract by GAS.)

THE application of centrifugal force or "inertia" to the removal of solids and liquids from gases has been practiced for many years. The efficiency of removal was rarely 100 per cent and the performance was ineffective upon minute particles of dust or fine droplets of liquids. Because of these defects, the mechanical separator was in disrepute; other methods, more effective in principle and design, became available but at prices which, for many purposes in the gas industry, were considered prohibitive. Recent conditions in the gas industry have brought about a greater demand for gas cleaners and modern development in fundamentals have made available better, cheaper, and a greater variety of cleaners. Now one is forced to choose from this large assortment the type that fits the purpose and the price that can be paid. It is to assist one phase of such a problem that this study of the fundamentals of the centrifugal separators was prepared. This type of cleaner with its known limitations may be crude at best but has many uses applicable to gas transmission and possibly distribution.

FRANK WILLS

An equation has been developed which contains the four important factors for the design of a separator. The separating distance (S) is the width of the gas stream channel, (R) is the radius of curvature of the outside boundary of the channel, (U) is the velocity of the stream which with (S) determines the area of the channel, and (2π R) is the number of revolutions of travel of the stream within the separator.

Fig. 1 was prepared to facilitate approximate calculations over a limited range. It is based upon the developed equation and coefficients and the "diameter" (D) of the particle which is taken as the cube root of its volume. It is self-explanatory and serves as a guide as well as an illustration of the influence of some of the conditions and factors affecting the efficiency of operation.

Some commercial centrifugal separators will remove about 95 per cent of particles of five to six microns. For this class of work it is known that there is a limit to the size of the individual sections of the separator, it being made up of multiple units to meet the required capacity. It is claimed that some special separators of small diameter have operated successfully at tangential velocities as high as 1500 ft. per second. A home-made 6-in. by 12-in. separator, designed for sand, when tested on sand of from 40 to 200 mesh, gave complete recovery. On fresh cement dust, analyzing 12.3 per cent on 200 mesh, 19.5 per cent on 325 mesh, and 68.2 per cent through 325 mesh with approximately 25 per cent of the particles less than one micron, 94 to 96 per cent by weight was recovered at velocities from 67 to 95 ft. per second. At 26 ft. per second in the inlet pipe the velocity was too low to carry all the cement in suspension. At tangential velocities of 95 and 190 ft. per second the recovery was 86 and 84 per cent respectively. The higher velocities, although supplying greater force for the separation of the particles, apparently exceeded the capacity of the separator body and entrained dust on escaping to the outlet.

The capacity at which separators

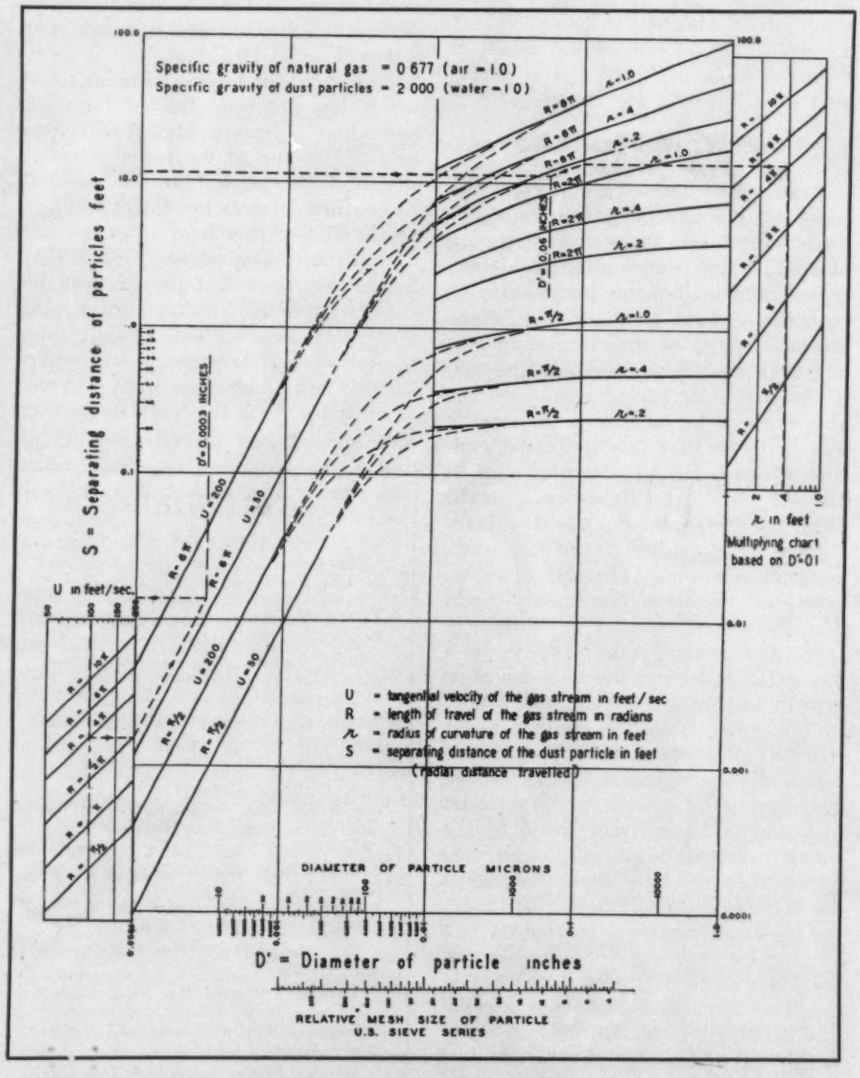

Specific gravity of natural gas = 0 677 (air = 1.0)
Specific gravity of dust particles = 2 000 (water = 1 0)
S = Separating distance of particles feet
D' = 0.05 INCHES
D' = 0.0003 INCHES
U in feet/sec.
U = tangential velocity of the gas stream in feet / sec
R = length of travel of the gas stream in radians
ℛ = radius of curvature of the gas stream in feet
S = separating distance of the dust particle in feet (radial distance travelled)
ℛ in feet
Multiplying chart based on D'=01
DIAMETER OF PARTICLE MICRONS
D' = Diameter of particle inches
RELATIVE MESH SIZE OF PARTICLE U.S. SIEVE SERIES

FIG. 1. Centrifugal separators. Radial distance traveled by dust particles in natural gas at 25 lbs. gage pressure.

maintain their efficiencies is probably more often controlled by the space allowed for the collection of dust or the means of retaining the dust that has been separated. Since the radial accumulations of the dust particle increases as the square of the tangential velocity one would expect improved efficiency with high velocities, but this is not necessarily true in practice. Two possible explanations are: first, that the dust particles by impact or a grinding action at the high speed are so reduced in size as to be readily entrained before being completely removed from the influence by the gas stream; second, the extreme turbulence in the gas at very high velocities is sufficient to interfere with the separation. Short radii and narrow channels permit higher velocities.

■ ■

Dedicate Foundation For A.G.A. Laboratory Branch

Ceremonies marking the laying of foundations for a new $40,000 Pacific Coast Branch testing laboratory to be erected by the American Gas Association at 1425 Grande Vista Street, Los Angeles, were held at the site of the building on Thursday, August 31. Arthur F. Bridge, vice president and general manager of Southern Counties Gas Co. and a member of the A.G.A. Laboratory managing committee delivered the principal address.

Gas appliance manufacturers and utility executives from all sections of the Pacific Coast, as well as other men prominent in civic and business affairs took part in the ceremony.

The new laboratory will be a one-story structure covering an area 100 by 91½ ft. It will be built of reinforced concrete and stucco over a steel frame and will be similar in plan to the Cleveland laboratory.

■ ■

Rio Gas & Power Co. Plans Service for Texas Town

The Rio Gas & Power Co., San Antonio, Texas, last month began a survey of Eldorado, Texas, in forwarding its plans for a $40,000 distribution system and a 9-mile, 2- and 3-in. transmission line to bring natural gas to the community from the Cooper Gas Co. wells in the Page field by October 1, according to an announcement by T. A. Hornaday, vice president of the company.

The company anticipates 150 connections as soon as the gas is available, estimating the domestic consumption at 75,000 cu. ft. per annum. Rates, which will be on a sliding scale, will average 63 cents per M c.f.

The company is also considering the piping of gas 22 miles from the Page field to Sonora, and a tentative franchise agreement has been reached.

■ ■

Prairie Du Chien, Wis., Grants Gas Franchise

The city council of Prairie du Chien, Wis., has recently passed an ordinance granting John L. Fagan a franchise to operate a natural gas plant. Under the terms of the ordinance, the franchise will run for an indefinite period, and the city reserves the right to purchase the plant before the franchise expires.

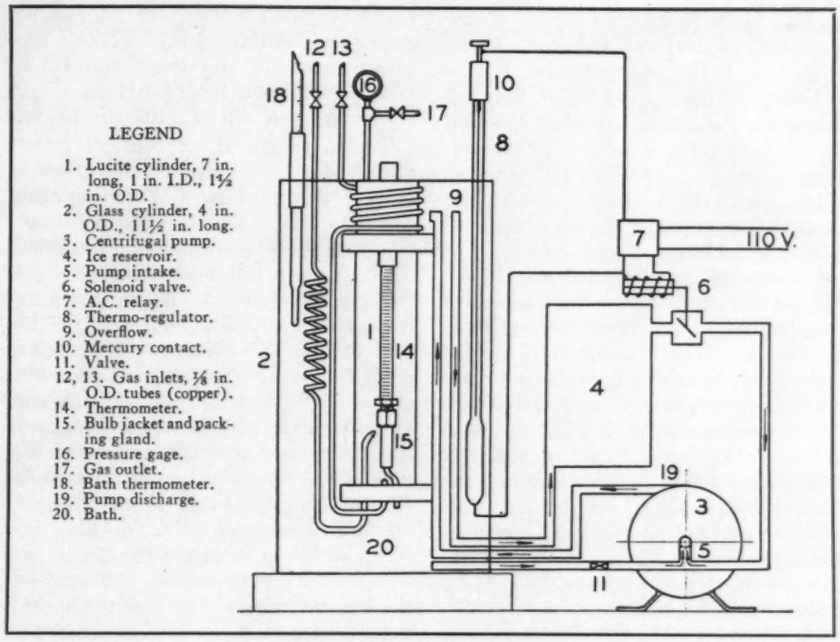


FIG. 1. Diagram of apparatus.

Lowering the Decomposition Temperature of Hydrates

BY maintaining the conditions under which natural gas hydrates will not occur their formation can be prevented. In practice this is done by operating above the hydrate formation temperature or by dehydrating the gas so that free water does not condense out. However, it is sometimes necessary to operate under hydrate formation conditions. Such a case now exists with the Southern California Gas Co. in the operation of a direct contact cooler at Kettleman Hills. In this cooler water is condensed from saturated natural gas by direct contact with cold water. It is desired to operate the cooler at a gas pressure of 400 lbs. per sq. in. gage and at a temperature of 50° F. in order to obtain a dew point of the cooled gas near 50° F. Under these conditions hydrates occur readily. Deaton and Frost give the formation temperature of hydrates from Kettleman Hills gas at 400 lbs. per sq. in. gage as 56° F.[1] Operating data indicate that the cooler can be operated at 53° F. without becoming plugged with hydrates. This is probably possible because at this temperature the hydrates formed at the top of the contact tower are carried to the bottom where they are decomposed by the relatively warm entering gas. At 50° F., however, the rate of formation is greater than the rate of decomposition and the contactor would eventually become plugged.

• **J. S. POWELL, Jr., Southern California Gas Co., Los Angeles, Calif., in a paper, "Lowering of the Decomposition Temperature of Natural Gas Hydrates by Solutes in Aqueous Solution," to be presented before the 46th Annual Convention of the Pacific Coast Gas Association to be held in San Francisco, Calif., September 6-9, 1939—(Abstract by G A S.)**

To make the cooler operate at this temperature, it would be necessary to reduce the hydrate formation temperature. A reduction of 4° would probably be sufficient. The most likely means of operating this lowering would be by the addition of some soluble substance to the water. Recently a paper was published by Hammerschmidt in which data were given on the lowering of the decomposition temperature of hydrates by aqueous solutions of non-electrolytes[2].

The study of the lowering in the decomposition temperature of natural gas hydrates by aqueous solutions, with which this paper primarily deals, was undertaken in an effort to find some suitable inhibitor for the prevention of gas hydrates in the direct contact cooler. Since this study required the construction of an apparatus in which gas hydrates could be formed and their decomposition temperature and pressure observed, use was made of it in

making a more general study of the nature of natural gas hydrates.

In Fig. 1, the reaction tube, 1, is a cylinder of transparent lucite. It is enclosed within a glass cylinder, 2, which is the jacket for a constant temperature bath surrounding the reaction tube. The bath is maintained at any desired temperature between room temperature and 35° F. by means of a small centrifugal pump, 3, which circulates the water in the bath and also pumps in ice water from the reservoir, 4. The ice water flowing into the intake, 5, of the centrifugal pump is controlled by a solenoid operated valve, 6, which is actuated through the A.C. relay, 7, by means of the mercury thermo-regulator, 8. The level in the bath is maintained by the overflow tube, 9, which returns bath water to the ice reservoir. The bath temperature desired is obtained within 0.2° F. by adjustment of the mercury contact, 10, and the valve, 11. Gas is introduced into the reaction tube through the inlet tubes, 12 and 13, which are coiled in the bath to allow precooling of the gas. The gas from these tubes is discharged from small orifices; their inlets being so located within the reaction tube that gas can be bubbled through a solution, or passed over its surface.

By means of a thermometer, 14, located within the reaction tube, the temperature of a solution therein can be determined. The bulb of this thermometer is guarded from the high gas pressure by a copper jacket and packing gland, 15. A small tube, from this jacket to the bath, maintains the bulb at atmospheric pressure. Fluctuations in the bath temperature are not indicated by this thermometer; it can be read to an estimated 0.1° F. The gas pressure within the reaction tube is determined by a Bourdon tube gage, 16, accurate to within 2 lbs. per sq. in.

Ten to 15 ml. of solution are introduced into the reaction tube through one of the gas inlets. From a high pressure gas cylinder, with regulator and valves not shown, gas is bubbled through the solution at pressures high enough to form gas hydrates. After forming, they are decomposed by depressuring. The pressure is then immediately increased to considerably above the hydrate formation pressure, and a stream of gas from the upper inlet is passed over the surface of the solution until a thin film of hydrate is formed. By depressuring slowly the decomposition pressure of this film can be observed to within about 2 lbs. per sq. in. at the temperature indicated by the inner thermometer. This method of determining pressure and temperature decomposition relations is essentially that used by Deaton and Frost[1].

Decomposition temperature and pressure data were determined for natural gas hydrates formed from the following solutions:

	Concentration (grams per liter)
Distilled water	—
Ethylene glycol	50
Urea	50
Urea	100
Sodium chloride	50
Sodium chloride	100
Sodium chloride	150

The composition of the natural gas used, as determined by a combustion analysis, was:

	Per Cent by Volume
Carbon dioxide	0.5
Oxygen	0.3
Nitrogen	0.8
Methane	83.60
Ethane	14.80

In Fig. 2 are given the decomposition temperature and pressure data obtained for these solutions.

To prevent hydrates forming in such equipment as cooling towers, refrigeration-dehydration plants, and in other equipment where hydrate formation is localized, the injection of a solution which could be circulated through the system would be practical. In this application a substance should be selected which would be non-volatile from solution in order to prevent its loss by evaporation. Suitable substances would be sodium chloride and ethylene glycol. Sodium chloride is more promising because its cost is much less and it is twice as effective. Solutions of it should not be corrosive where the gas contains small amounts of oxygen and where there are no dissimilar metals in the system. The addition of a suitable corrosion inhibitor to the solution, such as sodium dichromate, would reduce its corrosivity.

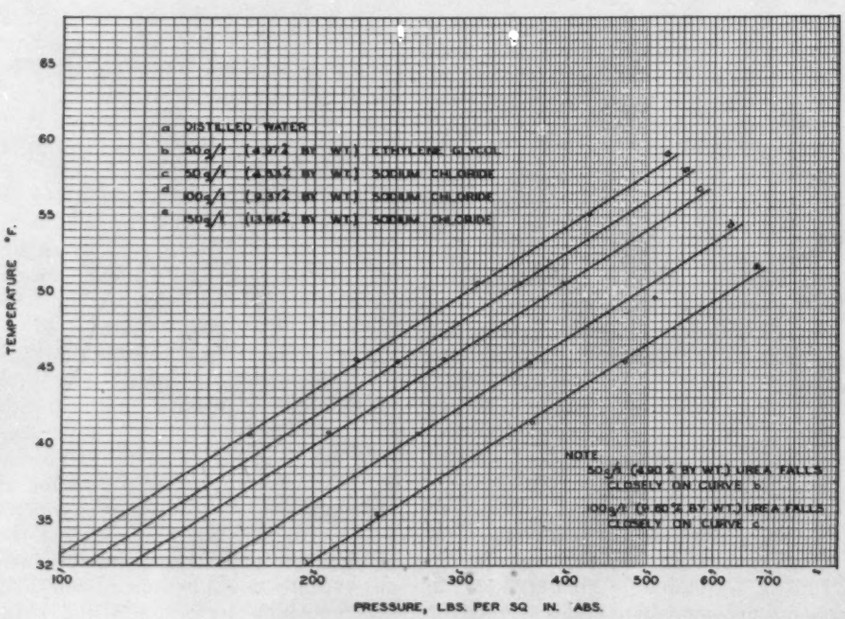


FIG. 2. Gas hydrate decomposition curves.

1. Deaton, W. M., and Frost, E. M., Jr., "Gas Hydrates," Natural Gas Dept. of the Am. Gas Assoc. Proc. 1938, pp. 112-119. *GAS*, June 1938, p. 31.
2. Hammerschmidt, E. G., "Preventing and Removing Gas Hydrate Formations in Natural Gas Pipe Lines," Natural Gas Section, Am. Gas Assoc., 1939. *GAS*, May 1939, p. 30.

■ ■

Robertshaw Publishes Book On Hidden Losses in Kitchen

Robertshaw Thermostat Co., Youngwood, Pa., makers of thermostatic controls, have published a new booklet, "Hidden Losses in Your Kitchen and How to Stop Them," for distribution to the commercial cooking field.

The booklet presents in compact form the over-all story of modern gas equipment, its purpose being to educate all factors in the commercial cooking field on the improvements made in gas equipment in recent years. According to Walter D. Crouch, manager of the Robertshaw Commercial Division, 30 Church St., New York, the booklet should be of assistance to the salesmen of gas companies and equipment dealers in selling their new equipment to the hotel, restaurant and general institutional field.

The booklet brings out facts and figures, substantiated by records of successful kitchen operators in all branches of the commercial cooking field, showing how modern gas equipment pays its way in reduced costs.

■ ■

Six Gas Companies Merge With Jersey Central Co.

Six New Jersey gas and electric companies have recently merged with the Jersey Central Power and Light Co., Wildwood, N. J., after being granted approval by New Jersey's State Board of Public Utility Commissioners. The six companies are the Cape Island Gas Co., Boonton Gas Light and Improvement Co., Ocean Gas Co., New Jersey Gas and Electric Co., May Gas Co., and Red Bank Gas Light Co.

Yes, There is a Commercial Water Heating Market

• W. S. WALKER, Consolidated Edison Co. of New York, Inc., New York, N. Y., in a paper, "There Is a Commercial Water Heating Market," presented before the American Gas Association Industrial Gas Section, Hotel, Restaurant, and Commercial Sales Conference, Brooklyn, N. Y., May 22 and 23, 1939. — (Abstract by G A S.)

THERE is a tremendous market for commercial water heating equipment which is still untouched: namely, in restaurants, lunch counters, soda fountains, bars, beer gardens, bake shops, butcher shops, grocery stores, beauty parlors and barber shops. It has been estimated that the average city has one commercial establishment of some kind which will require hot water for each 25 residents. Thus, a city of 250,000 people would have 10,000 commercial water heating prospects. With the exception of those establishments which require very large quantities of hot water, or which are supplied with this service from a central plant in a large building, gas-fired equipment will supply better service at less cost than is possible with the use of any other fuel.

Opportunities for securing commercial water heating business are undoubtedly greater today than ever before. One of the reasons for this is that the public is becoming more and more "sanitary conscious." Public opinion and various labor laws demand that suitable facilities be available at places of work for people to wash their hands. The public authorities have also been very active in the promotion of health laws and their enforcement after enactment.

Section No. 144 of the Code of Ordinances of the City of New York reads as follows: "Cooking, eating and drinking utensils are to be properly cleaned."

Commercial Regulations

Details of acceptable methods follow, and the practical result is that most eating places require 180° water at the sink or in the automatic dishwasher. This law has been on the books for many years, but the authorities have recently become much more active in its enforcement. There are also laws which call for facilities for hand washing in butcher shops and the washing of counters and chopping blocks with hot water. Hot water service for washing containers is required in shops dealing in almost any food product. Even baskets in which fish are handled must be washed in hot water. The requirement that the water for dish-washing purposes must be heated to 180° F. gives gas a definite advantage over other fuels. With coal it is especially true that the temperature is difficult to regulate. If the water must be kept above 180°, it will sometimes boil, with resulting danger. Large places which have a coal- or an oil-fired water heating system, when required to provide 180° water, will find it impractical to increase the temperature of the entire supply. The simplest solution is a gas-operated booster heater to increase the existing supply from 140° to 180°.

There are a number of facts to be taken into account in connection with a system that is to provide 180° water. First, the free oxygen which the water carries in solution is largely liberated at that temperature, and black or galvanized steel tanks and galvanized piping corrode very rapidly when exposed to this oxygen. This necessitates the use of non-ferrous tanks and copper or brass piping to the point of use. Because it is necessary to have brass piping for this 180° water and because the temperature would drop excessively, if the water is carried through long supply pipes, the booster should be located as near as possible to the point of use. This is, obviously, to the advantage of gas.

We have, in many cases, been called upon to provide 180° water for lunch counters which have automatic storage heaters having non-ferrous tanks, and have simply adjusted the thermostat to the higher setting with good results. In other small systems where the heater has a galvanized tank or where it does not have sufficient capacity for the added requirement, a "faucet type" heater has been installed at the point of use to boost the water to the required temperature. The use of this small heater as a booster is satisfactory only in places where approximately one gallon of 180° water per minute is adequate. All of the larger places serving food must have hot water at two temperatures, general service at about 150° and dish-washing at 180°. For such places, the only proper arrangement is a large heating system for general service and an instantaneous heater to boost part of the hot water from this system to 180°.

Systematic Coverage

The first step in planning systematic coverage of the commercial water heating market is to select a well-rounded line of equipment. Unless the sales organization is made up of specialists, some of whom can become thoroughly familiar with the application of heaters, it is desirable to have the line of heaters selected for promotion as simple as possible. In other words, do not have two types of heaters on the list intended for the same purpose, because this is confusing to the salesman and the customer. It is, however, necessary to have a number of different kinds of heaters in order to cover the market. This is because existing tanks must be used in many cases and because some installations require a direct connected heater and some require an indirect heater. There are space limitations to be taken into account in some cases requiring a special heater. In other cases instantaneous heaters are best suited for requirements. While it is not a simple job to round out the line of water heater equipment for promotion, a large part of the market can be covered by several types of standard heaters.

The Largest Market

Probably the largest market in terms of number of customers can be served with a heater of the "faucet type." This type of heater has only recently been introduced into America, although it has been used in Europe for many years. It is offered by two manufacturers. It supplies some 45 gals. of water per hour based on 60 per cent rise. It is simple to install, requiring only gas and water connections and no flue when installed in a room with reasonable ventilation and without a remote hot water outlet. The American Gas Association has recently approved of this practice relating to venting these heaters.

This type of heater is suited for stores, small garages, and other commercial establishments which require hot water for only one to three basins. Thousands of such places exist in every city and few of them have any dependable source of supply for the small amount of hot water that they require. Water heaters are as simple to sell in such places as gas ranges or domestic water heaters are in their respective markets. Very little special knowledge is required. "Faucet type" heaters have practically no stand-by loss. Therefore,

they give about the best operating economy of any heaters available.

In addition to this large market these heaters can also be used satisfactorily for supplying a small amount of 180° water to sinks in stores which serve food and which have another heater for general hot water service.

There is also a large market for the ordinary line of storage water heaters in the commercial field. Establishments which require more hot water for sanitary purposes than can be supplied by the "faucet type" heater are logical markets for the storage heater. Various commercial establishments, especially those heated with gas unit heaters, are not provided with any means of heating the washrooms. The installation of separate space heaters in the washrooms often presents a problem, partly because, if provided with automatic central and flue connections, the cost is prohibitive. A number of washrooms have been successfully heated by employing a finn-type radiator which is connected to a circulating line from the storage water heater. The amount of heat in the radiators can be regulated by means of a hand valve in the circulating line and heat to the radiators can be turned off completely in summer, leaving the water heater operating normally.

This is our standard practice now for heating the washrooms in the markets of a chain store organization which uses gas unit heaters for space heating. It gives a better result than would be realized through any heating means other than an automatic heater installation and it is much less expensive to install.

Size Is Important

It is a good rule not to size the equipment with a very large margin of safety since oversized equipment means high operating cost. It is better to have an occasional installation prove to be too small than to have most of them too large. It is still better to size them all just right.

The so-called high operating cost of an automatic gas water heater will be one of the first arguments made by the customer when a proposal is submitted. The reasons for the general impression that gas water heating is expensive should be fully understood by everyone selling water heaters. They are, that automatic water heaters which were placed in homes and in small commercial places have been, as recently as 1933, very inefficient. Some of them gave an over-all operating efficiency as low as 40 per cent in normal service, and when installed in commercial places, where they were not used up to capacity all of the time, the operating cost was entirely out of proportion to the service rendered. Since that time, however, there has been an improvement in automatic heaters which results in a reduction in operation costs amounting to some 35 per cent. Also, the customers who can be supplied by a "faucet type" heater will use less than half as much gas as they would have used with the old, inefficient heaters. Furthermore, there have been rate reductions in nearly every community which tend to make water heating costs lower. A very effective way of answering high operating costs objections is to give the prospect cost figures in terms of cents per 100 gals. of water heated.

Guessing Contest Boosts Gas Refrigeration Sales

A NOVEL guessing contest conducted by dealers in several of the towns served by the Southern Counties Gas Co., Los Angeles, was one of the factors which enabled that company to show June as the third highest month in gas refrigerator sales in company history; caused July to register a 36 per cent increase over a year ago; and allowed three of the company's eight districts to register July as an all-time high month, according to Clyde H. Potter, commercial manager.

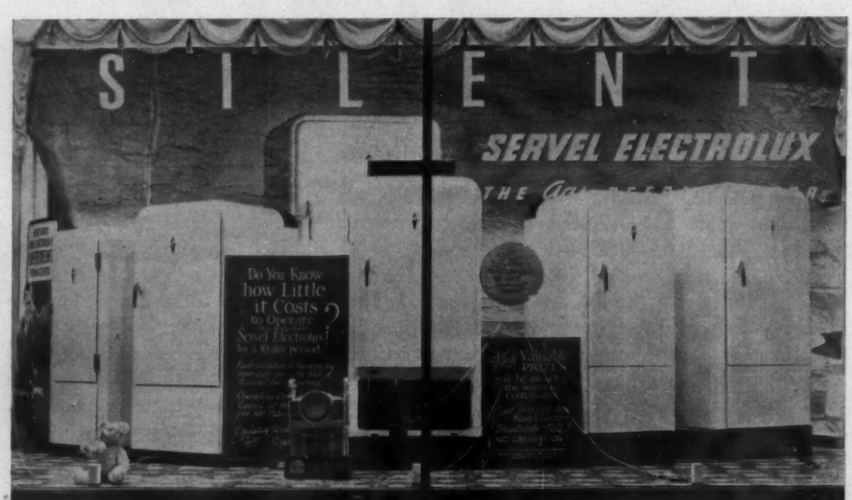
Instrumental in the success of the summer campaign were Electrolux contact men J. A. Somers and A. R. Combs, who introduced the "guessing contest" described below.

A natural gas meter with an 8-in. testing dial connected to a 6 cu. ft. Electrolux is set up in a dealer's display window for 30 days. The lower panel of the refrigerator is removed to display the burner and a mirror is placed at an angle under the burner so that the flame can be seen easily from the sidewalk. Where window display space permits, the current Servel 24-sheet poster is mounted on canvas and used as a background, and four or five gas refrigerators of varying sizes, in addition to the connected Servel, are placed in the window.

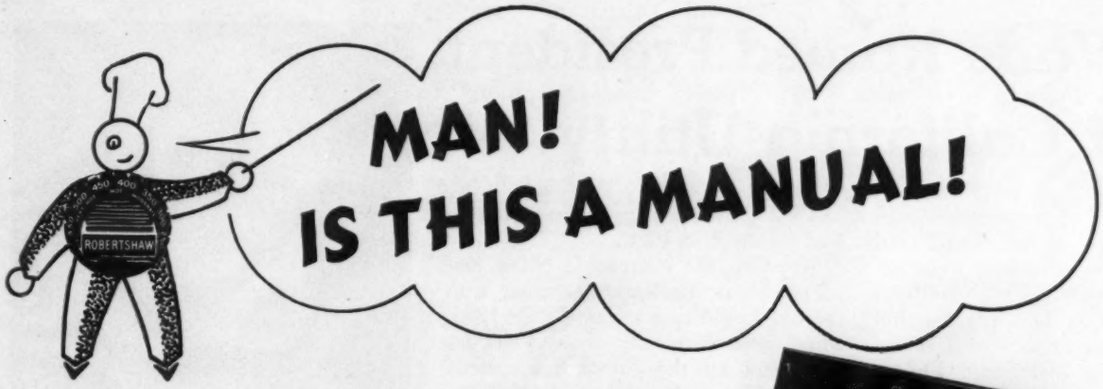
Adhesive tape is placed over the meter totalizer and consumers are invited to submit their estimates of the amount of natural gas that will be consumed during the 30 days, with the refrigerator connected day and night.

According to Mr. Potter, dealers have offered valuable prizes to add to the effectiveness of the contest. Sales have resulted already and a worthwhile prospect list has been obtained, as consumers are asked to state the make and age of their present refrigerator on the contest blank.

Contributing to company and dealer enthusiasm, along with Servel's national advertising campaign, was the $500 prize money offered to appliance dealers, company agents and salesmen who performed the best selling jobs.



A dealer's display window featuring the guessing contest designed to increase refrigerator sales in towns served by the Southern Counties Gas Company.



NOW you've *real* help in selling commercial equipment!

Every commercial cooking salesman and every kitchen supply house, important hotel, restaurant and institution on your lines should have a copy of this manual.

It brings together under one cover the latest developments in commercial gas equipment. It points out the hidden losses which obsolete cooking equipment causes. It proves, from the records of successful operations, that modern gas equipment quickly pays its way in fuel, food and labor savings as well as increased customer satisfaction.

FULL OF FACTS AND IDEAS!

COFFEE MAKING
How modernized gas equipment makes better coffee at lower cost

STEAM TABLE OPERATION
How controlled heat in steam tables improves quality of food

DEEP FAT FRYING
How better fried foods can be prepared with the modern gas-fired deep fat fryer

SHRINKAGE
How shrinkage is reduced and profits increased by the modern gas range

THE REVOLUTION IN BAKE OVENS
How the bake oven has been changed to meet the needs of today's kitchen

THE DEMAND FOR STERILIZATION
How the demand can be met completely and economically with modern gas appliances

FREE

A limited number of copies of *Hidden Losses* will be supplied free to gas companies. Write for a copy today for examination.

ROBERTSHAW THERMOSTAT COMPANY
COMMERCIAL DIVISION SALES OFFICE
30 CHURCH STREET, NEW YORK
MAIN OFFICE, YOUNGWOOD, PA.

F. S. Wade Named President Of California Utility

RETIREMENT of the president and the chairman of the board, and election of a new president were announced August 29 by the Southern California Gas Co., Los Angeles, following a meeting of directors at the company's offices, 810 South Flower Street.

The two executives now retiring are Addison B. Day, board chairman, and Alexander B. Macbeth, president and general manager, both of whom left active service on September 1. This was the date for their normal withdrawal from office under the company's long - established retirement plan. They both will continue as directors.

F. S. Wade, for many years president and general manager of Southern Counties Gas Co., Los Angeles, which is affiliated through Pacific Lighting Corp. with the Southern California Gas Co., will succeed Mr. Macbeth. He will retain his connection with the Southern Counties Gas Co. as president, but is turning over to A. F. Bridge, vice president, the position of general manager.

The fact that Mr. Wade will act as president and general manager of the Southern California Gas Co. and president of the Southern Counties Gas Co., it is pointed out, does not mean that any merger of the two systems is contemplated. Both companies will continue to operate as entirely separate organizations.

Mr. Wade has been identified with the gas business in this area since 1905, when he went to work for the Los Angeles Gas Co. as chemist. He was active in the development of the then new oil-gas process. He joined the Southern Counties Gas Co. as superintendent in charge of operations in 1912 and became president and general manager in 1928.

Mr. Day, the company's oldest employe, began his business career with the old Los Angeles Gas Co. in 1895, when there were only about 4500 gas customers on the company's system. He rose through various positions to that of president and general manager in 1928, and became chairman of the board upon the merger of the Los Angeles Gas & Electric Corp. with the Southern California Gas Co. in 1937.

Mr. Day has served as president of the Pacific Coast Gas Association.

Mr. Macbeth has been identified with the Southern California Gas Co. since 1914, when he came to Los Angeles to become its vice president and general manager. He has been engaged in the gas business since 1898, and before coming to California was associated with the United Gas Improvement Co., the Atlanta Gas Co., and later was general manager of the Kansas City Natural Gas Co. of Kansas City, Mo.

In 1927 he was elected president of the Southern California Gas Co. Under his management the company has grown from a small local gas company to one of the country's largest organizations, distributing natural gas to nearly 700,000 customers in 156 southern California communities. He has taken an active part in affairs of the gas industry, having served as president of the Natural Gas Association of America, American Gas Association, and California Oil and Gas Association, and as vice president and director of the American Petroleum Institute.

Messrs. Day, Macbeth, and Wade are also active outside the utility field, being prominently associated with other business organizations and civic enterprises.

FRANKLIN S. WADE

ADDISON B. DAY

A. B. MACBETH

A. F. BRIDGE

Kentucky Natural Gas Begins $125,000 Pipe Line Program

A CONSTRUCTION program that involves the expenditure of $125,000 has been launched by the Kentucky Natural Gas Corp., Owensboro, Ky., according to W. J. Hinchey, vice president and general manager, and entails the laying of a new 8-in. pipe line from the Russellville (Ky.) gas field to Oaktown and an additional 6-in. line from Oaktown to the main north and south pipe line. Five carloads of the 8-in. pipe have already been strung and the ditching machine is at work. Two 100-hp. compressors have been set on the blocks and header connections made. The auxiliary equipment is being rapidly assembled. Two 50-hp. engines are in operation.

With the present program completed, pipe line facilities for the Russellville and Oaktown fields will be approximately 10,000,000 cu. ft. of gas per day, and with the addition of the large compressors the outlet facilities will be increased to 12,000,000 cu. ft. of gas daily. It is expected that the construction program will be completed early this month.

■ ■

Statistics Show Texas Leads In Gas Production

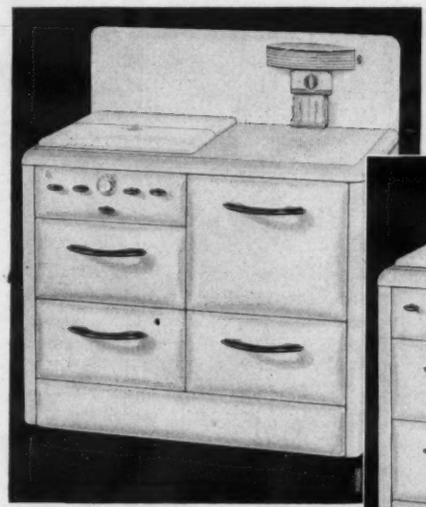
Texas furnished over 36 per cent of all the natural gas produced and marketed last year in the United States; is the largest producer and also the heaviest consumer of natural gas, it was stated recently in a report issued by the Texas Mid-Continent Oil and Gas Association. The Panhandle gas field is the largest natural gas reservoir in the world, and from it gas is piped to several other states for consumption. Texas itself consumes nearly 76 per cent of the total amount of gas marketed.

■ ■

J. W. Finley, Former Empire Gas and Fuel Counsel, Dies

Judge James W. Finley, 64, former general counsel of the Empire Gas and Fuel Co. utilities at Bartlesville, Okla., died July 26 following an automobile accident. Judge Finley had been general counsel for the Empire companies since 1926, resigning in 1937 because of ill health.

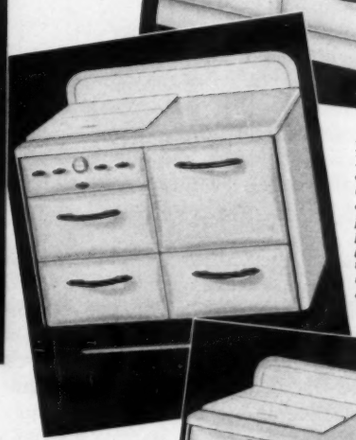
6 Outstanding *Gas Ranges* to Retail at $54.50 to $99.50



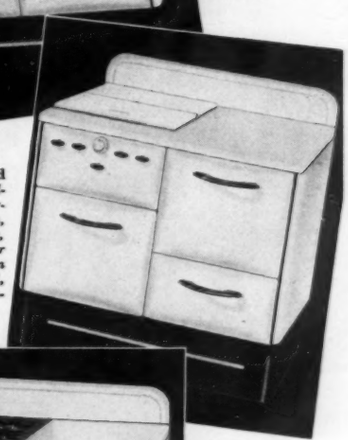
No. 39239 and No. 69239. *Lamp, time reminder, condiment set, folding cover top, chrome burner pan, pull-out drawer broiler with chrome smokeless grill, extra heavily insulated, two utility drawers, ball bearings on all drawers.*

No. 3922 and No. 6922. *Chrome burner pan, folding cover top, pull-out drawer broiler with chrome smokeless grill, extra heavy oven insulation, two spacious utility drawers, ball bearings on all drawers.*

No. 39989 and No. 69989. *Lamp, time reminder, condiment set, folding cover top, two-tone base, porcelain burner pan, pull-out drawer broiler with porcelain pan and porcelain smokeless grill, two utility drawers, ball bearings on all drawers.*



No. 3997 and No. 6997. *Folding cover top, porcelain burner pan, pull-out drawer broiler with porcelain pan and porcelain smokeless grill, two roomy utility drawers, ball bearings on all drawers.*



No. 39964 and No. 69964. *Folding cover top, porcelain burner pan, drop-door broiler, porcelain broiler pan with porcelain smokeless grill, roomy utility compartment.*

No. 3996 and No. 6996. *Porcelain burner pan, drop-door broiler, porcelain broiler pan with porcelain smokeless grill, roomy utility compartment.*

Here are six ranges designed and built for one specific purpose: to help you sell at a profit to the tremendous market made up of prospects who will pay less than one hundred dollars!

Here is not one promotional range, but a complete line to meet the requirements of every prospect as to size, equipment, and price. Every one of these numbers is a masterly combination of eye-appeal, mechanical excellence, up-to-the-minute features, and rock-bottom prices. They're equally powerful attractions for special promotions and regular day-to-day selling. They'll sell at a profit themselves—and produce sales of higher priced ranges.

Plan now to give these Detroit Jewel and Garland ranges an important place in your fall and winter appliance merchandising. Write, wire, or phone for specifications and prices.

All Have These Wanted Sales-Closing Features: Flush Cooking Top • Automatic Top Lighter • Porcelain Top Grates • Aluminum-Nickel Top Burners • Big, 20-inch Deep Porcelain Oven • Oven Heat Control • Heavily Insulated Oven • Sanitary Oven Tray • Smokeless Broiler Grill • Exclusive Inner Seal Oven and Broiler Door Construction • Plus Many More!

DETROIT-MICHIGAN STOVE COMPANY • DETROIT

See the Detroit Jewel and Garland Exhibit at the New York World's Fair. Space 6, Gas Industries Building.

DETROIT JEWEL AND GARLAND

SALES Slants

• THIS SERIES of articles dealing with sales fundamentals, which began in the Sales Slants department of the June, 1939, issue with a chapter entitled, "Getting Yourself in the Proper Frame of Mind," is continued this month with Chapter 4, an analysis of how people buy. These articles are not intended as a course of study nor do they aim to teach a new system of selling, but rather it is their purpose to present in a direct and unacademic manner a few of the fundamental principles on which the art of selling is based.—EDITOR.

Need—Money—Occasion— These Three Govern Sales

LAST month, exploring the mechanism of a buyer's mind, we took a simple illustration of two men buying milk. Analyzing the transaction, we came to the conclusion that a salesman cannot hope to influence another person to purchase a piece of merchandise unless and until he knows the specific motive which prompts that person to buy. For all practical purposes, there are as many answers to the question: "Why do people buy?" as there are people buying. That was our conclusion.

Now we come to a second important point in the buying process, which is a sort of corollary to the above. In our last chapter we asked the why of it. Now we must examine the how of it. How do people buy things?

This morning, let us suppose, Mrs. Jones set off downtown on a shopping tour. Preparing her wardrobe for a trip a month or so hence, she had in mind looking at hats, gloves and shoes, and possibly a dress or two. In the window of the first store she came to, was just the sort of light sport coat she had always wanted, and glancing down at her coat, she realized that it was pretty much on the shabby side. So she made one decision: she certainly needed a coat.

Then she noted a price tag propped in front of the coat in the window — only $17.50. It looked like a bargain all right; but wouldn't her budget be all shot, she said to herself, if she spent that much on a coat? Well, perhaps she could do over a hat, and maybe after all her shoes were good enough. And thus she decided a second thing: she had the money.

And now she was ready to go in and look at the coat, to see if it was really as good as it looked. The clerk got it out of the window, and she tried it on. It fit beautifully, and the material was excellent. But she hesitated.

"I don't know," she murmured to the clerk, "I really didn't intend to get a coat today."

"That is the last one we have in that line," the clerk replied. "That is the reason for such a low price. We are closing the line out, and I'm afraid unless you take it today it will be gone."

"Well, I guess I'd better take it then," she said.

And so she made a third and last decision: the occasion is now.

How did Mrs. Jones come to buy that coat? First, she determined that she needed it; second, she made up her mind that she could afford it; and third, she decided that the present was the proper moment to buy it. And those are the three decisions that seem to control the buying of anything by anyone: (1) the need; (2) the money; (3) the occasion.

You will find that the way to a sale along any route is marked by those three guide posts, and it is the job of the salesman to point them out to his prospect. In Mrs. Jones' case, she made the need decision herself. But in selling many things — gas appliances, for example — it is often necessary for the salesman to help the prospect realize the need. The housewife feels she doesn't need a new gas range, since the one she now has does well enough; but the salesman, knowing the savings in time, convenience and general comfort that will be hers if she has a new range, proves the need.

Having admitted the need, then, but objecting that she hasn't the money, she must be assisted in making a second decision. And it is a function of good salesmanship to show his prospects how they can afford the appliances he is selling. If you have done a good job in selling the need, you will have little difficulty in getting the price decision, since all the elements that are in the need are also in the price.

And then the salesman must help his prospect over the third and biggest hump. Almost everyone hates to make that final decision: shall I do it now? There are so many doubts that suddenly spring to mind at the moment of making the decision. Do I really need it? What will my family say? Can I believe what this salesman has been telling me? To all these bothersome little questions the salesman must be able to interpose a forceful answer.

Of course the three buying decisions do not always occur in the order named. Having seen a bargain and having decided that now is the time to buy, a person might then arrive at the other two decisions. And the salesman who encounters a prospect who has come to the conclusion that now is the time to buy has a good opportunity to assist him in making the other two decisions!

So an understanding of how people buy things is very important to the salesman, first, because it affords a basis upon which he may plan his sales talk, and second, because it gives him a way to check up on the progress of his sales effort. We will see in ensuing chapters how this ties in with the selling process.

Thus far we have been discussing general principles, in an attempt to clarify our thinking before getting down to cases. In our next chapter we will begin to talk about the selling process itself.

■ ■

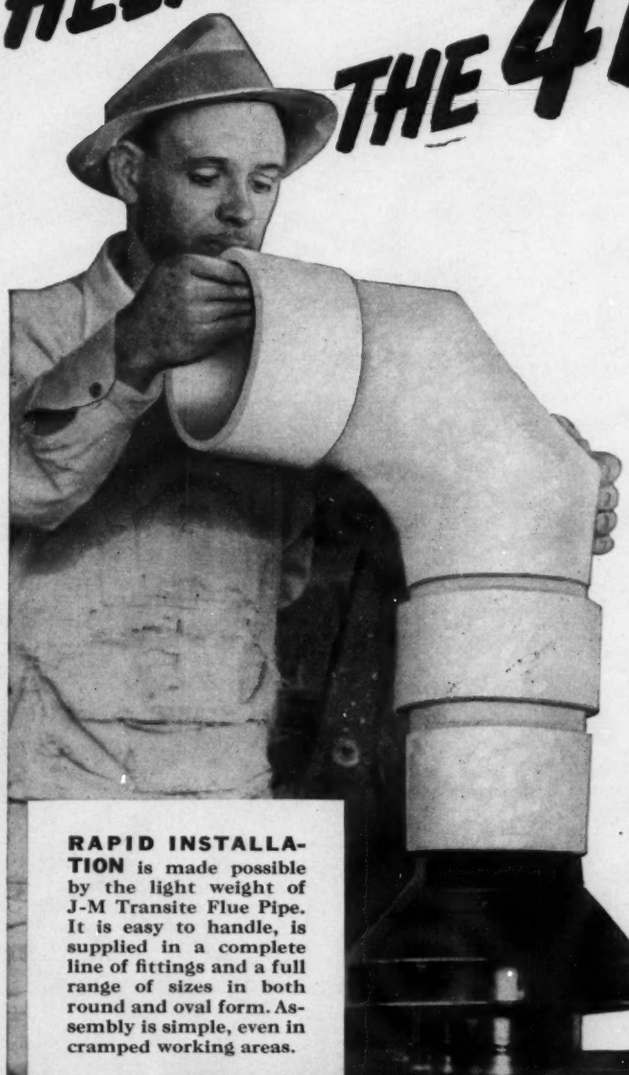
Better Heating Campaign Opens $800,000 Market

A "Better Heat for Better Health" campaign, involving a 10-week advertising schedule to run in more than 140 papers, was launched on August 28 by the United Gas Corp., Houston, Texas.

It is estimated from a company market analysis that there are 4000 homes and business firms in the territory served by the corporation through its dealers in which better heating equipment can be installed this year. This makes a potential sales volume of approximately $800,000 and the advertising campaign is intended as an aid in selling a high percentage of that market.

A symbol to represent the service of the United Gas Corp., and which will appear in all of the advertising schedule, is a little girl called "Tiny Flame." Dressed in working clothes and her sleeves rolled up, she will continually be telling or demonstrating the advantages of natural gas service. In the kitchen she will wear a cooking apron; at the refrigerator her suit will be like that of an Eskimo, and when she uses the water heater she will don a bathrobe.

HELPS GAS DO THE "4 BIG JOBS"



RAPID INSTALLATION is made possible by the light weight of J-M Transite Flue Pipe. It is easy to handle, is supplied in a complete line of fittings and a full range of sizes in both round and oval form. Assembly is simple, even in cramped working areas.

YOUR strongest selling point on gas appliances . . . for heating, cooking, refrigeration or hot water . . . is their reliability. But that promise must be backed up with an installation that gives completely satisfactory service under any conditions. When it comes to venting systems, it will pay you to check up on J-M Transite Flue Pipe. You'll find its long life and virtual freedom from upkeep are important factors in keeping customers sold on the dependabilitv of gas.

Made of asbestos and cement, Transite is completely fireproof . . . fully approved by the National Board of Fire Underwriters. It is highly resistant to weather and corrosion, and its low conductivity minimizes temperature drop in stacks. Transite Flue Pipe is supplied in a complete line of fittings, a full range of sizes. Installations are easily and rapidly finished—even in cramped working quarters.

You'll be interested in learning how Transite Flue Pipe minimizes costly repeat calls and safeguards your profit margin. An interesting new brochure, TR-13A, gives all the facts. For your copy, write Johns-Manville, 22 East 40th Street, New York, N. Y.

JM JOHNS-MANVILLE TRANSITE FLUE PIPE

OUTDOORS, as well, Transite's asbestos-cement structure provides important advantages. It is exceptionally resistant to weather and corrosion. And its low heat conductivity keeps stack temperatures high for long distances, improves draft and minimizes condensation in the flue.

INDOORS, the asbestos-cement composition of J-M Transite Flue Pipe substantially reduces fire hazard . . . helps keep maintenance costs low.

Gas Utility Revenues Show Marked Gain This Year

DOMESTIC customers served by manufactured and natural gas utilities totalled 16,154,100 on June 30, an increase of 317,400 over the number reported on the same date a year ago, it was announced August 11 by Paul Ryan, chief statistician of the American Gas Association.

Revenues of manufactured and natural gas utilities aggregated $444,541,100 for the first six months of 1939. This was an increase of 5.8 per cent from the corresponding period of 1938.

Revenues from industrial and commercial users increased 8.3 per cent, while revenues from domestic customers gained 4.7 per cent.

Manufactured gas industry revenues totalled $190,849,000 for the first six months, an increase of 2.6 per cent from a year ago. Revenues from industrial users of manufactured gas increased 10.9 per cent, while commercial revenues gained 1.5 per cent. Revenues from domestic uses, such as cooking, water heating, refrigeration, etc., were substantially unchanged from the corresponding period of 1938.

Revenues of the natural gas industry for the first six months amounted to $253,692,100, a gain of 8.3 per cent from a year ago. Revenues from industrial uses increased 11.2 per cent, while revenues from domestic uses increased 7.3 per cent.

The quantity of natural gas used in generating electric power during the six months ending June 30, amounted to 87,002,000,000 cu. ft. This represented an increase of 15.8 per cent over the amount used during the corresponding period of 1938.

Gas appliance sales throughout the United States increased sharply during the first six months of this year as compared to sales figures for the corresponding months in 1938, it was reported by C. W. Berghorn, managing director of the Association of Gas Appliance and Equipment Manufacturers, New York City.

Sales of gas-fired furnaces registered an increase of 101.0 per cent for the first six months of 1939 over sales of the same months in 1938.

Gas range sales for the first six months of 1939 increased 38.4 per cent over the same period in 1938.

Sales of gas refrigerators for the first six months of 1939 were 30.0 per cent ahead of sales during the same months in 1938.

The gas water heater industry reports an increase of 28.1 per cent in the sales of automatic gas-fired water heaters during this six-months period as compared to sales during corresponding months in 1938.

Sales of gas-fired boilers registered a rise of 5.6 per cent for the first six months of 1939 as compared to the same period in 1938.

■ ■

"Life Begins at '40" is New Sales Slogan of Servel, Inc.

"Life Begins at '40 for the Gas Refrigeration Industry," emerged as the keynote and theme slogan for next year's expanded sales and promotional plans of Servel, Inc., which program was discussed at final sessions of national and regional sales executives of the company at the Hotel Roosevelt, New York, August 1-5, according to word received from George S. Jones, Jr., Evansville, Ind., vice-president and general sales manager of the company.

The 1940 promotional program was presented at the meeting by H. S. Boyle, the company's sales promotion manager.

■ ■

N. Y. Co.'s Sales Victory Means Vacation for Tots

Sales department employes of the Consolidated Edison Co. of New York have donated their $1,105 first prize money, derived from victory in the First Division of the 1939 "Man-the-Sales" Campaign sponsored by the Refrigeration Committee of the American Gas Association to the Children's Welfare Federation of New York, according to word received from E. F. Jeffe, vice president. The money will be used to send 73 underprivileged New York children to a summer camp for a two to three weeks stay.

■ ■

Heating Campaign Adds to Columbia Utilities' Load

Trips to the New York World's Fair have been offered as prizes to winners of employes cooperative sales campaigns being conducted this summer by the Cincinnati Group of the Columbia System of utilities. In the gas house heating campaign, May 1 to September 30, 17,050 M c.f. or 65 per cent of the quota of 26,000 had been installed at the end of July. William J. Hodde was leading the contest, and was also ahead in the bonus points campaign.

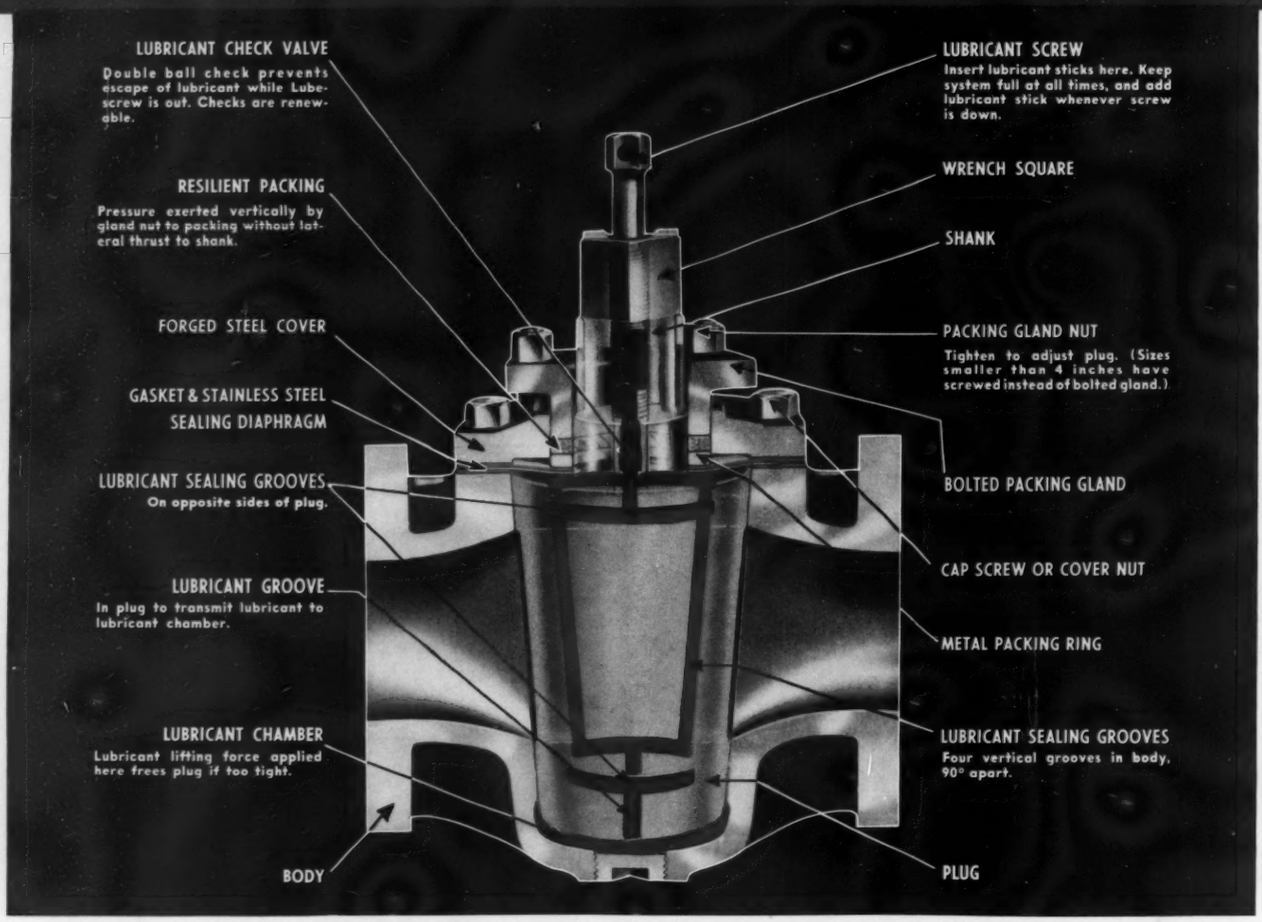
DOTTED LINE ROSCOE

"— and now, Mrs. Potski, you can have fun in the kitchen!"

"Ain't no ordnery plug cock what'll hold that likker, Luke.
Reckon we gotta git a Nordstrom Plug Valve."

Nordstroms OUTLAW GAS LEAKS

IT'S THE "SEALDPORT" METHOD OF LUBRICATION THAT PREVENTS INTERNAL AND EXTERNAL LEAKAGE


LUBRICANT CHECK VALVE
Double ball check prevents escape of lubricant while Lubescrew is out. Checks are renewable.
RESILIENT PACKING
Pressure exerted vertically by gland nut to packing without lateral thrust to shank.
FORGED STEEL COVER
GASKET & STAINLESS STEEL SEALING DIAPHRAGM
LUBRICANT SEALING GROOVES
On opposite sides of plug.
LUBRICANT GROOVE
In plug to transmit lubricant to lubricant chamber.
LUBRICANT CHAMBER
Lubricant lifting force applied here frees plug if too tight.
BODY
LUBRICANT SCREW
Insert lubricant sticks here. Keep system full at all times, and add lubricant stick whenever screw is down.
WRENCH SQUARE
SHANK
PACKING GLAND NUT
Tighten to adjust plug. (Sizes smaller than 4 inches have screwed instead of bolted gland.)
BOLTED PACKING GLAND
CAP SCREW OR COVER NUT
METAL PACKING RING
LUBRICANT SEALING GROOVES
Four vertical grooves in body, 90° apart.
PLUG

Sizes:
¼" to 30"
•
ASK FOR BULLETIN

MERCO NORDSTROM VALVE CO.

A Subsidiary of PITTSBURGH EQUITABLE METER CO.

WORLD'S LARGEST MANUFACTURERS OF LUBRICATED PLUG VALVES; GASOLINE, OIL & GREASE METERS

Main Offices: 400 Lexington Ave., PITTSBURGH, PENNA.

Branches: New York City, Buffalo, Philadelphia, Columbia, Memphis, Chicago, Kansas City, Des Moines, Tulsa, Houston, Los Angeles, Oakland. *Canadian Licensees:* Peacock Bros., Ltd., Montreal. *European Licensees:* Audley Engineering Co., Ltd., Newport, Shropshire, England.

PRODUCTS: Nordstrom Plug Valves • Nordstrom Air, Curb and Meter Cocks • Nordstrom Valve Lubricants • EMCO Gas Meters • EMCO-McGaughy Integrators • EMCO Regulators • Pittsburgh Meters for Gasoline, Grease, Oil, Water and other Liquids • Raybould Couplings • Stupakoff Bottom Hole Gauges

Wrench-operated
•
Gear-operated
•
Remote-control operated

NORDSTROM VALVES

WITH PATENTED "SEALDPORT" LUBRICATION

Only Nordstrom • meet every major valve need

TABLE NO. 1. EFFECT OF UNEQUAL THERMOCOUPLE RESISTANCES ON INDICATED AVERAGE TEMPERATURES.

Test No.	Thermometer Readings of Thermocouple Locations—°F., and Resistance of Thermocouples—Ohms						Average of Thermometer Readings °F.	Thermocouple Reading °F.	Deviation from Average of Thermometer Readings per cent
	T. C. 1		T. C. 2		T. C. 3				
	Temp.	Res.	Temp.	Res.	Temp.	Res.			
1	211	6.5	211	6.5	82.5	6.5	168.2	169.5	+ .47
2	211	6.5	84	6.5	84.0	6.5	126.3	126.0	− .24
3	211	6.5	211	6.5	84.0	6.5	168.7	169.0	+ .18
4	211	16.65	211	6.5	85.0	6.5	169.0	157.3	− 7.4
5	211	16.56	211	16.62	85.0	6.5	169.0	143.0	−15.4
6	211	16.56	211	16.62	86.0	16.64	169.3	165.0	− .59

Parallel-Connected Thermocouples for the Testing of Gas Appliances

By WALTER B. KIRK and GEORGE J. PACANOVSKY

American Gas Association Testing Laboratories

AT American Gas Association Testing Laboratories, many special applications of thermocouples have been developed to measure temperature in the course of testing and research activities. One of the particularly interesting applications consists of using a number of thermocouples in parallel to obtain an indication of the average temperature over a given area or volume.

The results obtained from a theoretical and also an experimental analysis of the conditions involved in the study of parallel-connected thermocouples can be summarized as follows:

1. When thermocouples are properly made and applied, they can be used in parallel to obtain an indication of the average temperature.

2. The above statement is true only when the resistance of each thermocouple in a particular circuit is equal to the resistance of each of the other thermocouples used and the resulting thermal e.m.f. measured potentiometrically. The importance of having each thermocouple of equal resistance is emphasized by the test data shown in Table No. 1.

3. The hot junctions of the thermocouples must be electrically insulated from each other throughout the medium under test. The cold junction, or point at which the parallel connections are made, however, must consist of a good electrical connection between the various thermocouples in the circuit.

4. The temperature versus e.m.f. characteristic of the particular thermocouples used must be a straight line function, or relatively so, in the range of the temperatures being measured.

On the basis of the observations stated above, the following procedure is recommended for the construction and application of parallel-connected thermocouples:

1. Thermocouples may be made from iron and constantan, copper and constantan, or chromel and alumel wire. Other metals that have the necessary linear temperature vs. e.m.f. characteristic may be employed. The metals mentioned, however, suffice for temperatures up to about 2200° F.

2. Any number of thermocouples may be used in parallel provided each thermocouple is composed of the same material and assembled in the same manner as each of the other thermocouples in the group, and further provided that the lead wires for all couples are of the same length.

3. Wire of uniform resistance along its entire length is required. When equal lengths of lead wires are used, the possible error will be within ± 2.5 per cent of the true average temperature even though the individual temperature points may vary by as much as ± 100 per cent from the average temperature. Such accuracy is well within acceptable limits for ordinary appliance testing and gas engineering work.

4. The average temperature along each of the several thermocouple lead wires should be approximately equal over at least 75 per cent of their entire length. In ordinary appliance testing, this condition obviously can be satisfied by having at least 75 per cent of the length of the lead wires outside of the appliance and in the room where temperature gradients are small.

5. When temperature differences between the various hot junctions and the average are greater than 100 per cent, when working at high temperature levels, or where a high degree of accuracy is required, it is necessary to have the resistance of the thermocouples as nearly equal as possible. This may be accomplished by comparing the resistance on a Wheatstone's resistance bridge and adjusting the wire lengths accordingly. The possibility of error due to non-uniformity in the resistance of the wire or changes in the resistance of an individual thermocouple while in service (caused by the temperature coefficient effect) can be negated by either substantially increasing the length of the lead wires or by inserting a calibrated wire-wound resistor of 50 to 100 ohms value in series with each thermocouple. These resistors must be of equal value and may be the regular radio or instrument type low-wattage units. They should be placed in any one arm of each thermocouple and located so that they are all at the same temperature.

6. Temperature readings should be made by means of a recording or indicating potentiometer, or similar instrument in which no current flow exists when the balance point is reached.

Parallel-connected thermocouples fabricated according to this plan have been used successfully at the American Gas Association Testing Laboratories for some time. Particular applications include the measurement of average temperatures of flue gases and in broiler and oven compartments of ranges, along thermostat rods or tubes and in clothes-drying compartments.

THE WOMAN'S *Viewpoint*

Home Service Conference Draws Industry Leaders

MORE than 100 home service women, home economics teachers and students from all parts of the United States and from Hawaii convened August 22, 23, 24, and 25 at the Chapman Park Hotel, Los Angeles, Calif., to attend the third successful home service conference and training course sponsored by the Home Service Committee of American Gas Association. The training course, highlighted by actual demonstrations of home service work and visits to demonstration kitchens in the Los Angeles area, was designed to help home service women solve their mutual problems and to acquaint home economics teachers and students with home service work and the use of new equipment.

GLADYS PRICE

Gladys B. Price, chairman of the Home Service Committee, and home service supervisor of the Southern California Gas Co., Los Angeles, introduced the course at the first session, and Norman R. McKee, vice president, Southern Counties Gas Co., Los Angeles, outlined "What the Utility Expects of Home Service." New trends in home service work were discussed by F. M. Banks, vice president, Southern California Gas Co.

The first day's sessions were climaxed by a banquet dinner given by the Association of Gas Appliance and Equipment Manufacturers. Host Wayne R. Smith, Continental Water Heater Co., and vice chairman of the Pacific Coast Division of the A.G.A.E.M., introduced Al Rice, Southern California Gas Co., who, as master of ceremonies, presented a program of music and other entertainment. More than 125 conference delegates, appliance and equipment manufacturers, and representatives from the Los Angeles Board of Education attended the dinner.

Jessie McQueen, home service director, A.G.A., New York City, outlined what is expected of home service departments in her talk on "Home Service Today." Other angles of utility home service work were discussed by Gladys B. Price; Jane Tiffany Wagner, Servel, Inc., New York City, whose topic was "What the Customer Wants to Know"; Vira Bardwell, Southern California Gas Co., Alhambra, who discussed women's club luncheons. First-hand information on "Home Service Abroad" was presented by Pauline Edwards, home service director, Honolulu Gas Co., Honolulu, T. H.

Looking at home service from the teaching standpoint, Eleanor Spike, home economics professor, Oregon State College, Corvallis, Ore., told how home management training prepares for home service, and Elizabeth Sweeney, Syracuse University, Syracuse, N. Y., discussed home service training in colleges.

Demonstration skits were presented by Marguerite Scroggie and Margaret Lackland, Southern Counties Gas Co.; Florence Windecker, Margaret Martin, and Harry Booth, Southern California Gas Co.; and Colleen Fowler, Kansas City Gas Co., Kansas City, Mo.

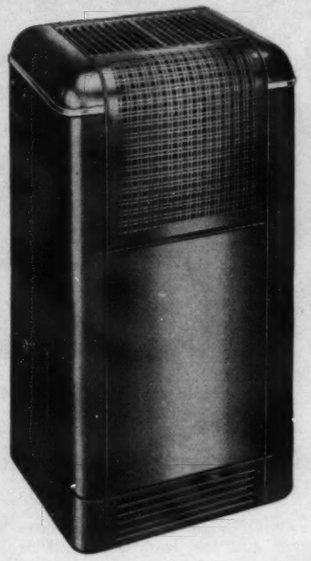
Group conferences on problems of district, one city, and one-girl department systems were conducted by Catherine Cahalan, Public Service Electric and Gas Co., Elizabeth, N. J.; Ruth Sheldon, Washington Gas Light Co., Washington, D. C., and Mary A. Crossan, West Texas Gas Co., Lubbock, Texas.

Special features of the four days of sessions and discussions were the luncheon given by the Payne Furnace Co. at its Beverly Hills auditorium, followed by a luncheon demonstration by Lucile Martens, Southern Counties Gas Co., visits to model kitchens, and a beach party at the Deauville Club, Santa Monica, Calif., sponsored by western range companies and western representatives of eastern range companies.

Prominent guests of the conference included R. S. Agee, sales promotion manager, A.G.A.E.M.; F. M. Rosenkrans, the Gas Service Co., Kansas City, Mo.; F. O. Suffron, A.G.A. Testing Laboratory, Los Angeles; and C. A. Miller, Servel, Inc., Oakland, Calif.

Informal shots taken at the A. G. A. Home Service Conference held in Los Angeles, August 22-25. Left: A group of delegates at one of the general sessions. Center: Florence Windecker and Peggy Martin, both of Southern California Gas Co., demonstrate a modern CP gas range. Right: Jane Tiffany Wagner, home service director, and A. L. Spring, district sales manager, Servel, Inc.

HOWLE *Gas Heaters**



EASIER TO SELL

MORE ECONOMICAL

MORE EFFICIENT

*With or without automatic control.

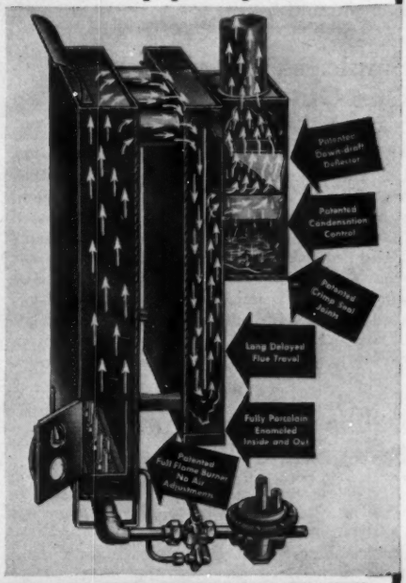
All over the country Howle Gas Fired Heaters are selling faster because of their smart modern design and their exclusive construction features that mean greater efficiency and fuel economy. Every feature is a sales boost in the modern day market that is seeking luxury, comfort and convenience at a popular price.

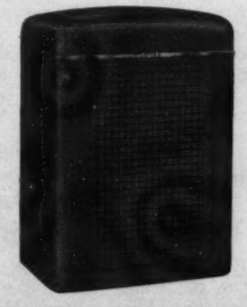
Look at the inner unit construction of the Howle Gas Fired Heaters at the right and see for yourself why Howle is growing in popularity every month. New engineering ideas developed for increased efficiency and greater fuel economy. Howle Gas Fired Heaters are built for dependable long service — never rust, never grow old. The finish can be washed with soap and water and always looks like new.

In 3 Efficient Attractive Sizes

Vastly improved Armco enameling stock iron construction, full vitreous porcelain enameled throughout and corrosion proof (even against salt atmospheres). Finished in blended wood tones to harmonize with room furnishings.

Model	*Input Rating*	*Dimensions*
A-30	30,000 B.T.U.'s	18x18x41
A-45	45,000 B.T.U.'s	18x22x44
A-60	58,000 B.T.U.'s	18x26x47


Patented Down-draft Deflector
Patented Condensation Control
Patented Cramp Steel Joints
Long Delayed Flue Travel
Fully Porcelain Enameled Inside and Out
Patented Full Flame Burner No Air Adjustments



HOWLE PANEL HEATER

Here's another type of Howle Gas Heater that combines radiant and convected heat into a highly efficient and economical unit. A large heating surface with a long delayed flue travel produces maximum heat. Made to meet a lower income bracket market. Comes in modern streamline design in three sizes:

Model	*Input Rating*	*Dimensions*
B-30	30,000 B.T.U.'s	22x19x36
B-45	45,000 B.T.U.'s	22x19x39½
B-60	58,000 B.T.U.'s	24½x19x43½

Write for Illustrated Folders and Complete Details

THE HOWLE COMPANY

2515 ARCHER AVENUE
CHICAGO, ILLINOIS

STOP

Expensive service calls and customer complaints because ordinary flue pipe rusts out quickly.

Use VITROLINER

The Permanent Flue Connection for Gas Water Heaters and Circulating Space Heaters

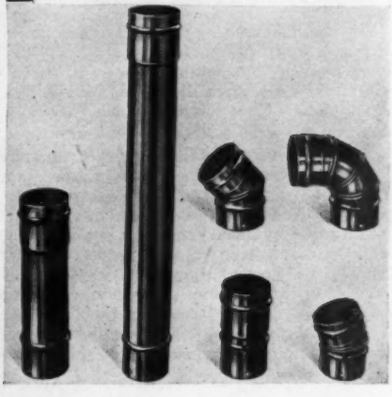
Suggest VITROLINER on all new installations and old flue replacements and you can promise lasting service and a more finished harmonious appearance. VITROLINER is coated inside and out with a special high temperature, acid resisting vitreous enamel of a neutral brown color. Seamless—perfectly smooth finish. Comes in 3" and 4" pipe in 6", 12" and 24" lengths with three different elbow fittings.

Takes less time to install because no cutting or fitting is required. A 2½" lap on each piece of pipe makes VITROLINER adjustable to an extra ½" to 1" more length. Makes a perfect fitting job every time. Will last as long as the heater itself, never rusts, and never looks old. Suggest VITROLINER and eliminate expensive service calls. Most every consumer will see the economy of its long time satisfactory service. Write for illustrated folder and price list.

Condensation Engineering CORPORATION

2515 ARCHER AVE., CHICAGO, ILLINOIS

Canadian Representative, Chas. A. Dyson
784 Dundas St., London, Ont.



A highlight of the Home Service Conference and Training Course was the banquet dinner given for the delegates by the A.G.A.E.M.

Oklahoma Association Sets Sept. 15 for Gas Session

THE Gas Division of the Oklahoma Utilities Association will hold a one-day convention at the Biltmore Hotel, Oklahoma City, Okla., September 14. W. L. Woodward, president, Zenith Gas System, Inc., Alva, Okla., gas division chairman, will preside.

According to the tentative program announced by Mr. Woodward the meeting will open at 10 a.m. with an address on "Duties of a District Manager," by L. D. Black, Lone Star Gas Co., Ennis, Texas. Other subjects to be presented at the morning session include: "Dealer Aids in Promoting Gas Sales," F. M. Rosenkrans, Gas Service Co., Kansas City, Mo., and "Application of Temperature and Velocity Boosters," E. C. McAninch, chemist, Oklahoma Natural Gas Co., Tulsa, Okla.

Following a noonday luncheon, the afternoon session will start with an address by Carl Dean, Oklahoma Natural Gas Co., on "High Bill Complaints." Other afternoon subjects placed on the tentative program include: "Servicing Appliances," by E. A. Bartolina, Consolidated Gas Utilities Corp., Blackwell, Okla., and "Air-Conditioning," by Don Mayne, air-conditioning division, Williams Oil-O-Matic Heating Corp., Bloomington, Ill.

Each subject will be opened for discussion.

■ ■

Oklahoma Salesmen Earn Free Trip to N. Y. Fair

Six special railway cars carrying prize-winning retail salesmen representing Oklahoma dealers who handle Electrolux gas refrigerators distributed by Hales-Mullaly, Inc., of Oklahoma City, left Oklahoma City August 19 for the New York World's Fair.

Hales-Mullaly gave this free trip to more than 100 dealer-salesmen who made their "first trip" quotas on sales of gas refrigerators, and to 33 ladies who are traveling on "extra-trip" quotas earned by some of the salesmen. Salesmen who participated in the contest, which was conducted through the months of May, June and July, and who made their quotas based on their average sales for three years, were awarded the free World's Fair trip by Hales-Mullaly. Those who exceeded these quotas by stipulated amounts were awarded the "extra trip" tickets.

Carter Mullaly, president, and Harry C. Canup, sales manager, of Hales-Mullaly Co., report that the sales contest resulted in sale of about 100 per cent more gas refrigerators than was anticipated.

■ ■

Employes' Tips Result In One Out of Four Sales

One out of every four gas appliances sold since the first of this year by the Citizens Gas and Coke Utility, Indianapolis, Ind., has been the result of an employe tip, the company reported recently. The report showed that of all contracts signed between January 1 and June 30, 1939, 28 per cent were direct results of tips from employes whose living was not directly dependent on the sale of gas appliances. A further breakdown showed that of the total number of tips turned in by non-selling employes 17 per cent resulted in sales.

■ ■

Dallas Gas Co. Entertains Prospects at Luncheons

A total of 43 prospective range buyers were entertained at two luncheons given recently by the Dallas (Texas) Gas Co.'s home service department. Half-hour cooking demonstrations were given at the meetings by Albertine Berry, home economics director, following a showing of the movie, "Never So Embarrassed." In her demonstrations Miss Berry explained the origin of the CP range requirements.

■ ■

Home Economist Proves Gas Cooking Is Cool

Cool cooking when the temperature is 115 degrees in the shade was demonstrated to Kansas women by Adelle Morgenson, home service department of the Gas Service Co., Kansas City, Mo. Miss Morgenson, in a demonstration in Beloit, Kan., thanked her audience for their attention during the hot afternoon, and said, "I imagine you were much hotter than I." One woman remarked, "And she's working right beside the gas range too."

Petroleum Exposition Sends Invitations to Oil Nations

INVITATIONS by the United States Government and the International Petroleum Exposition have been extended to the oil producing nations of the world seeking their participation in the 1940 Exposition to be held in Tulsa, Okla., May 18 to 25. The government of Greece has already appointed delegates to the 1940 show, according to G. L. Depasta, minister-counselor of Greece in Washington, D. C.

The invitation, a large portfolio, bound in purple velveteen and imprinted with the name of the country and ambassador in gold ink, containing a letter from Exposition President W. G. Skelly, the resolution passed by the United States Congress inviting other nations to the exposition, a picture of a proposed new International Building, and other pictures and information about the show, was presented to each of the ministers of oil producing nations in Washington recently.

■ ■

Recipes, Menus Published by Home Service Director

Nearly 100 menus and 840 recipes are contained in a new cook book, *The Discriminating Hostess*, by Ella Liner Lambert, home service director of Milwaukee Gas Light Co., Milwaukee, Wis. Menus are planned for wedding breakfasts, brunch, special luncheons, oven dinners, fish dinners, and formal dinners, teas, buffet suppers and evening refreshments. All recipes are tested, many of them having won prizes, and each gives temperature for cooking, the time, and the yield. Directions for setting the table for different occasions and instructions in the use and care of the modern gas range are included in the volume.

Copies of the book may be obtained from Miss Lambert (price, $2.50).

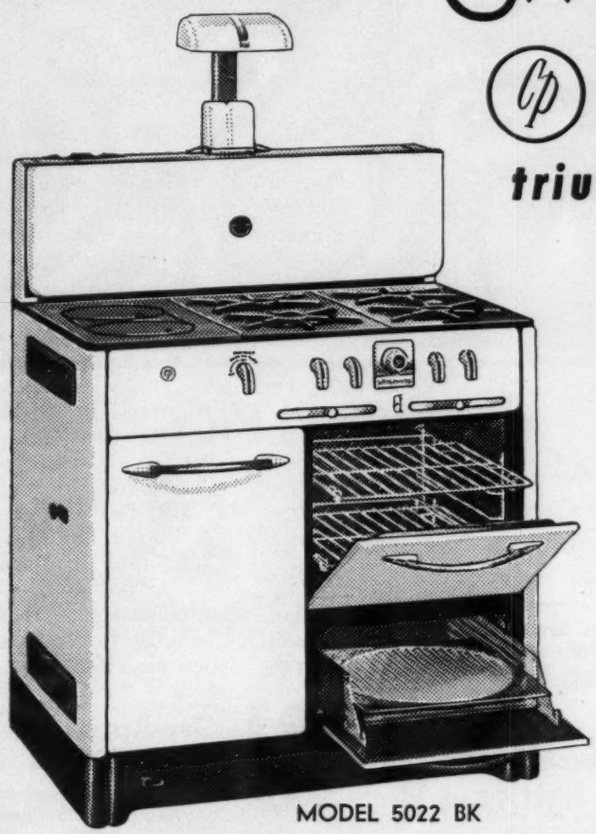
■ ■

Home Economist Appointed

Lillian Rhoades, Edwardsville, Ill., has been appointed to the home service staff of the Gas Service Co., Kansas City, Mo. Miss Rhoades will begin work in Topeka, Kan., under Jewel Hensley, director. She is a graduate of Iowa State College, Ames, Iowa.

★ *New* WEDGEWOOD GAS RANGES

triumph in cooking conveniences



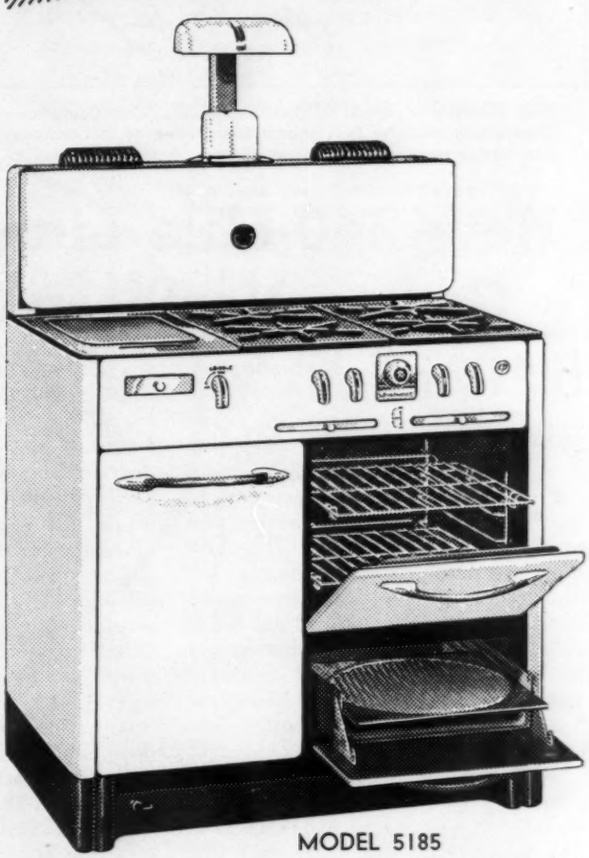
MODEL 5022 BK

DESIGNED FOR MODERN KITCHENS WHERE SPACE IS LIMITED!

MODEL 5022 BK. Equipped with full size kitchen heater for burning wood or coal, this delightfully compact gas range cooks your food, heats your rooms and burns your trash.

MODEL 5185. With built-in top griddle and warmer supplies the definite need for a gas range that fits compactly into small kitchens—and still retains the features that make every WEDGEWOOD so popular.

MODEL 5285 is the same style, exactly, as Model 5185 with the addition of a built-in gas circulating heater. Provides instant warmth at the turn of a knob.



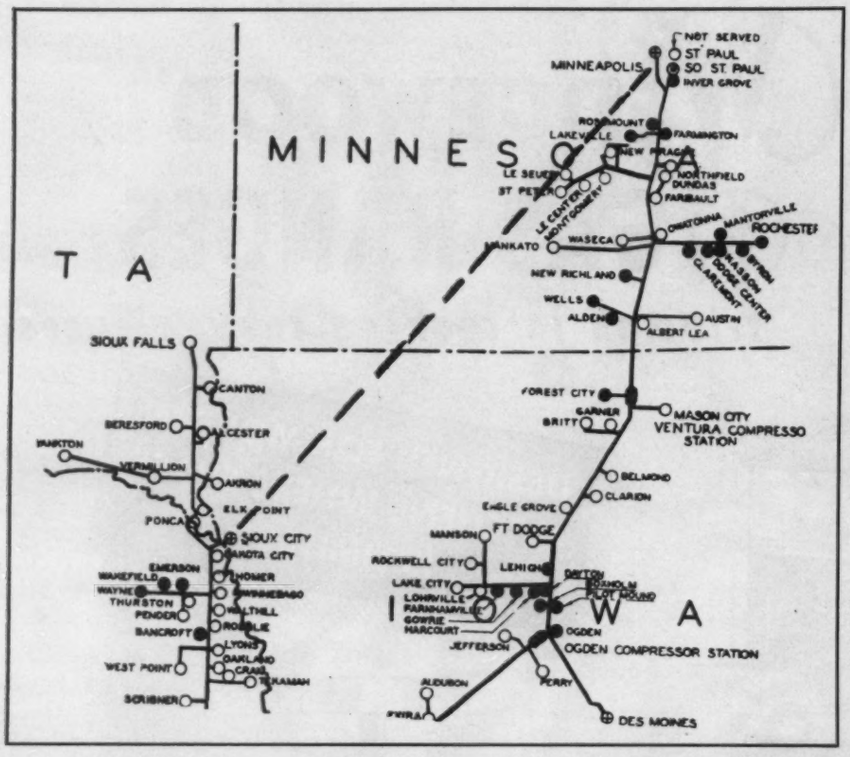
MODEL 5185

★ *New* BEAUTY
★ *New* FEATURES
★ *New* ECONOMY

Gas THE MODERN FUEL

WEDGEWOOD **THE MODERN GAS RANGE**

JAMES GRAHAM MANUFACTURING CO. • San Francisco - Los Angeles - Newark, Calif. - Portland, Oregon



Map showing a portion of Northern Natural Gas Company's Pipe Line System. The dotted line indicates the approximate course of the company's new 240-mile natural gas carrier soon to be constructed from Sioux City, Iowa, to Minneapolis, Minnesota.

New 240-Mile Line Brings Gas to Northern Areas

OFFICIALS of the Northern Natural Gas Co., at Omaha, Neb., have announced the construction of a new 240-mile, 16-in. pipe line extending from near Sioux City, Iowa, to a point near Minneapolis, Minn., according to word received from H. J. Carson, vice president of the company. The new pipe line will provide substantial additional capacity for the Minneapolis area, and will make natural gas available to a large number of communities in Northwestern Iowa and Southern Minnesota, which have not heretofore had the advantages of natural gas service.

The company has just completed a program of refinancing, which involves the issuance of $16,000,000 of 3¼ per cent first mortage and first lien bonds, and $6,000,000 of unsecured promissory notes.

Proceeds of the bond issue will be used to retire the company's outstanding bonds. Proceeds from the notes will be utilized largely in the construction of the new line.

Work on the construction of the line will start immediately, to be completed by November. It is planned to put the new pipe line into operation before winter. The Peoples Natural Gas Co., a subsidiary company of the Northern Natural Gas Co., as well as other gas distributing companies, have been granted franchises for the distribution of natural gas in many communities along the new line.

The construction of the pipe line includes the installation of compressor stations, lateral pipe lines, and distribution systems needed to supply towns not now receiving natural gas service. A number of branch lines and distributing systems for supplying communities in Iowa and Minnesota will be constructed and connected to the new line this year.

The line will be of solid welded construction and coated with Wailes-Dove Hermiston enamel with asbestos felt wrapper. Pipe will be supplied by the National Tube Co., The Youngstown Sheet & Tube Co., and Republic Steel Corp.

Compressor station requirements will be: (1) one 1300-BHP Worthington unit added at the Palmyra, Neb., compressor station; (2) the construction of a new compressor station, consisting of two 800-BHP Cooper-Bessemer units near Dakota City, Neb.

The bonds necessary for refinancing were issued under a mortgage, recently executed with the Harris Trust & Savings Bank of Chicago, and recorded in 95 counties through which the company's pipe line passes, extending from Texas, through Oklahoma, Kansas, Nebraska and Iowa, into Minnesota and South Dakota.

The Northern Natural Gas Co., one of the largest gas systems in the middle west, obtains its gas supply from the Texas Panhandle and the Otis and Hugoton fields of Kansas, and at present supplies approximately 158 towns in Nebraska, Iowa, Minnesota and South Dakota. The headquarters of the company are in the Aquila Court Building, Omaha.

Contracts for construction of the new line from Sioux City to Minneapolis have been let to two construction firms, C. S. Foreman Co. of Kansas City, Mo., and The Truman-Smith Construction Co. of Eldorado, Kan. The two contractors will each maintain two crews on the construction, working simultaneously on four separate sections in order to complete the line at the earliest practicable date.

■ ■

San Antonio Gas Appliance Dealers Form Organization

Dealers in gas and electric appliances of San Antono, Texas, last month formed a new merchandising organization, the Electric and Gas Appliance Society of San Antonio, electing as president J. W. Thiele, refrigeration sales manager of the Straus-Frank Co. Ed Gauthier, San Antonio Public Service Co., was elected vice president, and Lester Hill of A. C. Toudouze Co., secretary-treasurer.

The new organization replaces the San Antonio Radio and Refrigeration Trades Association.

■ ■

Sapulpa Co. To Be Sold

Approval was recently given the Oklahoma Natural Gas Co., Tulsa, by the federal district judge of the Tulsa area for the purchase of the Sapulpa Gas Co., Sapulpa, Okla. The Sapulpa company will be sold for $180,000, following a petition by the bondholders for the sale.

■ ■

Hastings Investigates Plant

The City of Hastings, Neb., has recently appointed F. E. Devlin, consulting engineer of Kansas City, Mo., to investigate the gas plant serving the city, now owned by the Central Power Co. Mr. Devlin is to give the city an appraisal of its value, as well as the estimated cost of a complete new system.

■ ■

Safford, Ariz., To Have Gas

Construction of a distribution system for the town of Safford, Ariz., was scheduled to begin soon following the granting of a $100,000 RFC appropriation to the city. City Engineer A. A. Weiland has estimated it would take six months to complete the project.

TWO *Improved* PAYNE UNITS★ MAKE NEW FRIENDS FOR GAS!

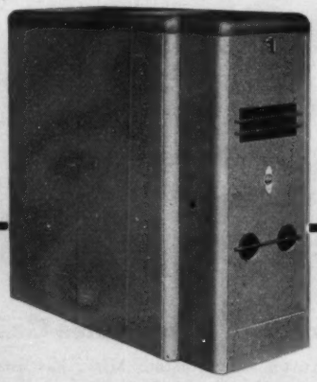
Already nationally recognized as outstanding leaders in the gas heating field, the Payne Zoneair and Forced Air Units are now offered with *NEW pace-setting features!* Here is *more help* to you in putting across the Big Fourth of the Four Big Jobs—

★ PAYNE ZONEAIR

Here is a gas-fired furnace which has won widespread acclaim for its efficient performance of every function of *true winter air conditioning*—it heats, filters, circulates, ventilates and humidifies. Set up in batteries of two or more, compact Zoneairs provide *zoned* weather control to individual rooms or suites at the exact temperature desired.

NOW — the *improved* Payne Zoneair strides forward with these outstanding new features:

1. Scientifically designed heating element, die-formed from heavy gauge cold rolled steel, allows longer fire travel within the unit—*provides maximum fuel efficiency.*
2. Increased filter area assures *complete* cleansing of air passing through the unit.
3. The larger blowers used in Zoneair units give more efficient air delivery and quieter operation.
4. All moving parts—including long-hour motor—are mounted on rubber for smooth, quiet operation.
5. The *improved* Zoneair is shipped knocked down—cuts freight costs. Simplified construction speeds assembly and installation. Removable panels facilitate servicing.



The *improved* Payne Zoneair is finished in platinum grey with darker slate grey trimming. It is available in sizes from 60,000 to 200,000 B.T.U. Input Rating.

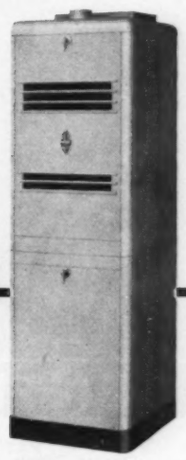
★ FORCED AIR UNIT

This modern gas-fired unit—which may be quickly installed in kitchen, closet or on the service porch—gives the small non-basement home *all* the advantages of an expensive basement installation—balanced warmth in winter, cooling ventilation in summer, clean refreshing circulation all the time!

NOW—in the *improved* Payne "FAU" — all its best features have been retained and new ones added to make it "tops" in small home heating. Here they are:

1. Replacement-type, glass-wool filters *clean* the air.
2. Complete factory assembly in *two* sections facilitates installation. A cinch to hook up.
3. New *compact* casing—10" shorter in the larger sizes; 22" shorter in the Model 60.
4. Larger blower, turning at slower speed, assures quieter, smoother operation. All moving parts are mounted on rubber to eliminate vibration.

The new Payne Forced Air Unit is available in four sizes—from 60,000 to 160,000 B.T.U. Input Rating. Superbly engineered to meet a specific purpose, the "FAU" *sells gas!*



IMPORTANT TO MANUFACTURED GAS COMPANIES

All Payne Furnace Units have just passed the latest A. G. A. requirements for either natural or manufactured gas. A luminous flame burner, for use especially with manufactured gas, is an *exclusive* Payne feature. Highly developed for combustion efficiency and quiet control, the luminous burner has proved to be far superior to the ordinary natural gas burner converted to manufactured gas use.

THE IDEAL FUEL GAS

Payne

FURNACE & SUPPLY CO., INC.

BEVERLY HILLS · CALIFORNIA

W. C. Beckjord Nominated For A. G. A. Presidency

WALTER C. BECKJORD, vice president and general manager of the Columbia Gas and Electric Corp., New York City, has been nominated for next year's president of the American Gas Association, it has been announced by the general nominating committee, N. C. McGowen, chairman. The committee's full report, which will be presented at the annual convention of the A. G. A. in New York City in October, is as follows:

For President—Walter C. Beckjord, vice-president and general manager, Columbia Gas and Electric Corp., New York, N. Y.

For First Vice-President—T. J. Strickler, vice-president and general manager, Kansas City Gas Co., Kansas City, Mo.

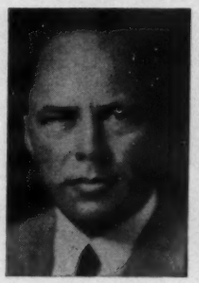
For Second Vice-President—George F. Mitchell, president, The Peoples Gas Light and Coke Co., Chicago, Ill.

For Treasurer—Ernest R. Acker, president, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y.

For Directors—2-year terms: Frank H. Adams, president, Surface Combustion Corp., Toledo, Ohio; James B. Black, president, Pacific Gas and Electric Co., San Francisco, Calif.; Charles M. Cohn, vice-president, Consolidated Gas, Electric Light and Power Corp. of Baltimore, Md.; H. L. Dickerson, Ebasco Services, Inc., New York, N. Y.; Lewis B. Eichengreen, Philadelphia Electric Co., Philadelphia, Pa.; C. E. Gallagher, president, The East Ohio Gas Co., Cleveland, Ohio; N. Henry Gellert, president, National Public Utilities Corp., Philadelphia, Pa.; R. H. Hargrove, vice president anl general manager, United Gas Pipe Line Co., Houston, Texas; George S. Hawley, president, Bridgeport Gas Light Co., Bridgeport, Conn.; C. E. Paige, president, The Brooklyn Union Gas Co., Brooklyn, N. Y.; Louis Ruthenburg, president, Servel, Inc., Evansville, Ind.

The following men from the following companies have been nominated by section nominating committees to serve as section officers for the next Association year:

Accounting Section: For Chairman—F. B. Flahive, Columbia Gas and Electric Corp., New York, N. Y. For Vice-Chairman—E. N. Keller, Philadelphia Electric Co., Philadelphia, Pa.



W. C. BECKJORD

T. J. STRICKLER

Commercial Section: For Chairman—Davis M. DeBard, Stone & Webster Service Corp., New York. For Vice-Chairman—R. J. Rutherford, Worcester Gas Light Co., Worcester, Mass.

Industrial Gas Section: For Chairman—Franklin T. Rainey, The Ohio Fuel Gas Co., Columbus, Ohio. For Vice-Chairman—H. Carl Wolf, president, Atlanta Gas Light Co., Atlanta, Ga.

Manufacturers Section: For Chairman—E. R. Guyer, vice-president, Cribben & Sexton Co., Chicago, Ill.

Natural Gas Section: For Chairman—Elmer F. Schmidt, vice-president, Lone Star Gas Co., Dallas, Texas. For Vice-Chairman—Harry D. Hancock, president, Gas Advisers, Inc., New York, N. Y.

Technical Section: For Chairman—A. M. Beebee, Rochester Gas and Electric Corp., Rochester, N. Y. For Vice-Chairman—D. P. Hartson, Equitable Gas Co., Pittsburgh, Pa.

■ ■

Northern Oklahoma Buys Systems Totaling 1200 Meters

The Northern Oklahoma Gas Co., Ponca City, Okla., has made announcement of its purchase of the distributing system at Perry, Okla., formerly owned by the Apache Gas Co. (a subsidiary of the Republic Electric Power Corp., of San Francisco), and the transmission system in Perry that has been owned by Gas Transport Co. The deal was closed by A. L. Farmer, president of Northern Oklahoma Gas Co.

The distributing and transmission systems have a total of 1200 domestic meters.

■ ■

New Company to Distribute Electrolux Refrigerators

A new company known as the H. M. Brundage Co., of Richmond, Va., has been formed recently, according to an announcement by Henry M. Brundage, former sales manager of the Washington (D.C.) Gas Light Co. The company will act as authorized wholesale and retail distributors for Servel Electrolux gas refrigerators in the State of Virginia. General offices are at 205 North Seventh Street, Richmond.

■ ■

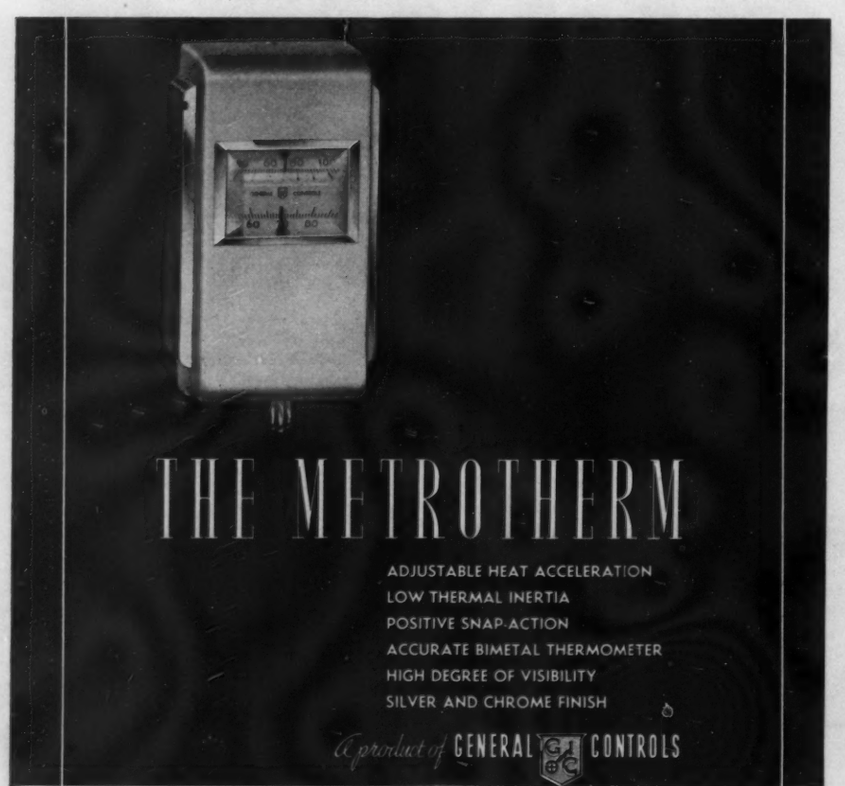
Koppers to Install Plant

The Citizens Gas and Coke Utility, the municipally-owned manufactured gas system at Indianapolis, Ind., has ordered a Koppers Seaboard Process Liquid Purification plant for its Prospect Street works.

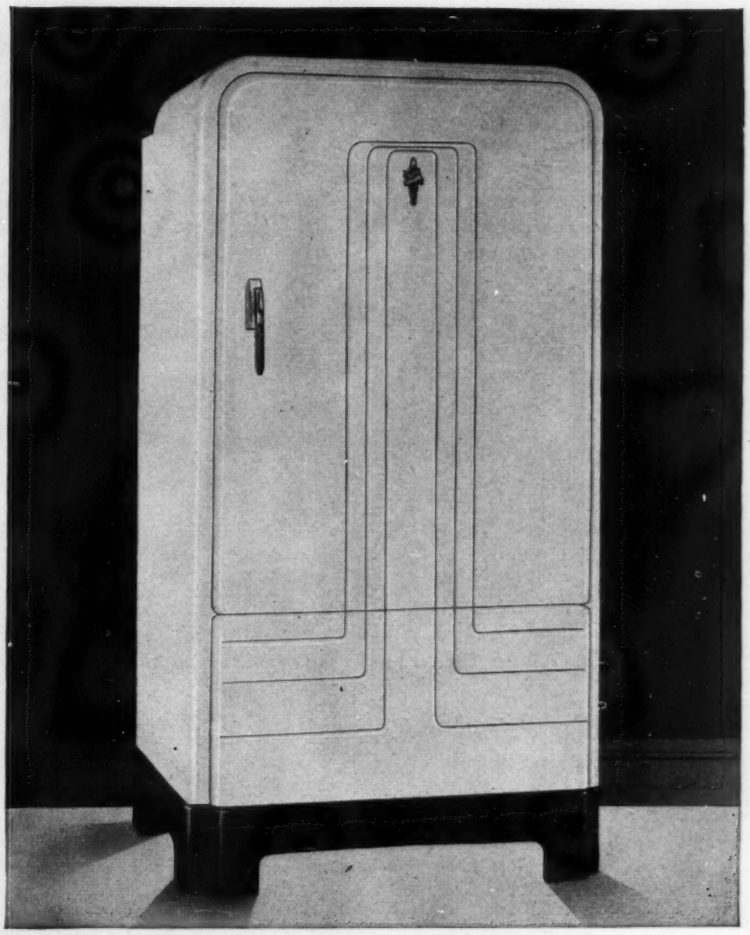
■ ■

Waveland, Miss., Votes Gas

The town of Waveland, Miss., has unanimously voted in favor of a new municipally-owned natural gas system.



Business is where you keep it...



MRS. WALSH likes her Servel Electrolux. She bought it last February, already says she "wouldn't part with it for love nor money."

By getting her to add gas refrigeration to cooking by gas, the utility protected their investment and present gas load.

Protecting *your* present gas load is both the best defense for your present business—and the best offense for getting new business. For you, business is not so much where you find it . . . as where you *keep* it.

Today, thousands of families like the Walshes are buying appliances in order to avail themselves of other gas services . . . and utility executives recognize the help of gas refrigeration in promoting the use of "Gas for All 4 Jobs."

Gas company executives are capitalizing on the trend, also, of increasing replacements of other-type automatic refrigerators with Servel Electrolux. They realize that, by selling gas refrigeration, they are taking advantage of an opportunity which, if lost today, may not recur for years to come . . . that, by so doing, they are not only protecting their present loads but are also keeping open their customers' doors for the sale of other gas services.

They know "business is where they *keep* it."

The SERVEL ELECTROLUX Gas Refrigerator

GAS REFRIGERATION:

- **PROTECTS YOUR PRESENT GAS LOAD**
- **INCREASES LOAD WITHOUT EXTRA INVESTMENT**
- **PROMOTES THE SALE OF OTHER GAS APPLIANCES**
- **PUBLICIZES THE MODERNITY OF GAS SERVICE**
- **PROMOTES THE USE OF "GAS FOR ALL 4 JOBS"**

WINS GOOD WILL FOR GAS SERVICE

Lone Star Extends Service To Texas Tubercular Home

NATURAL gas service replaced fuel oil and electricity in one of the largest tuberculosis sanitoriums in the United States, Texas State Tuberculosis Sanitorium, located on high plains in arid West Texas when the Lone Star Gas Co., Dallas, completed a 17-mile, 6- and 8-in. steel welded line to the institution from its main line near San Angelo, Texas, August 10. In addition to replacing fuel oil and electricity for cooking and heating, natural gas fired boilers will also generate steam for powering auxiliary electric generation equipment.

Operated by the State of Texas, the institution has capacity for 962 tuberculosis patients as a result of recent enlargement which brings the value of the sanitorium well above the $2,000,000 mark.

Under supervision of Luther Tolbert, assistant pipe line superintendent; J. C. Bickley, pipe line foreman for the Ballinger District; and David A. Turpin, assistant pipe line foreman of the Long Lake District, the line was completed between July 15 and August 10. Tapping the Lone Star main line near San Angelo, the new Sanitorium line runs northwest to the institution, which is near Carlsbad, Texas.

Construction of an extensive distribution system within the Sanitorium grounds was necessary to serve more than 28 major and auxiliary buildings, 16 of which are piped for gas service. This system was laid by a private contractor for the state.

Two 125-hp. water tube boilers were converted from fuel oil to gas with burners specially constructed from specifications of state engineers in cooperation with Lone Star industrial engineers. Plans include further installation of an additional 1000-hp. boiler for gas consumption.

The boilers furnish heat for the numerous buildings and power for a 300-kw., 2300-volt generator which carries part of the electrical load.

A battery of 14 heavy-duty and three domestic Garland ranges were installed in nine general and special diet kitchens. Six water heaters, one a 75-gal. Ruud De Soto, were included in appliance specifications. These appliances were sold to the Sanitorium by independent dealers.

A crew of nearly 100 was employed locally to augment the staff of regular company employes.

■ ■

Consolidated Edison Installs Air Beacons On Holders

Airplane beacons and signal lights are being installed on gas holders and on electric and gas plant stacks in the vicinity of North Beach Airport by Consolidated Edison Co. of New York. Conforming to United States Civil Aeronautics Authority standards, these aerial traffic lights will serve as a warning to pilots landing or taking off from the field at night.

Rising to a height of 400 ft., the 15,000,000 cu. ft. gas holder at Hunts Point gas plant in the Bronx and the 3,000,000 cu. ft. gas holder at Flushing will be topped with beacons having both vertical and horizontal beams, projected through red lenses. Two 15,000,000 cu. ft. holders at the Astoria gas plant and a holder at 137th Street in the Bronx will be lighted about the top with red signal lights in single and double arrangements.

Other utility properties within range of the airport to be illuminated are boiler house stacks at Astoria, coke oven stacks at Hunts Point and coal unloading bridges at Luyster Creek in the Astoria gas plant grounds.

Lighting installations will be completed by the middle of September.

■ ■

Safety Record Established By Dallas Gas Co. Drivers

More than 125 drivers of Dallas (Texas) Gas Co. cars were commended at a recent safety meeting by Ronald Vincent, member of the Dallas Citizens' Traffic Commission. The men have driven 4,824,513 miles without an accident.

Awards were presented to the drivers by George W. Martin, assistant general superintendent for the company, top honors going to D. F. Thomas, regulator department employe. Mr. Thomas has driven 215,968 miles during the past 10 years without an accident.

■ ■

Company Seeks To Serve Terre Haute Subdivision

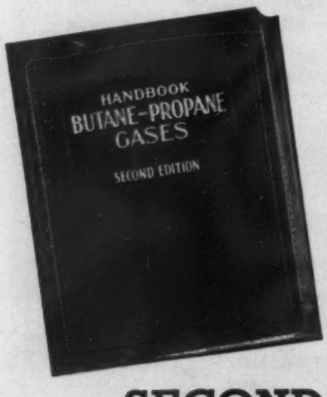
The Frank M. Pierson Natural Gas Corp., Indianapolis, Ind., has applied to the Public Service Commission for permission to construct a distribution system and serve natural gas to the Memorial Avenue subdivision of Terre Haute, Ind. The gas would be purchased from the Michigan Gas Transmission Corp. or the Kentucky Natural Gas Corp., both of which own main lines in the vicinity of Memorial Avenue subdivision. The B.t.u. of the gas would be 1000.

■ ■

Center, Texas, Votes for Gas

A $50,000 bond issue to provide funds for a municipal gas distributing system was voted recently by the citizens of Center, Texas. A survey of the city will be made to determine what construction will be necessary, after which bids will be received.

HANDBOOK
BUTANE-PROPANE
GASES



415 Pages

CONTENTS: Semi-Bulk Distribution: Use of Butane in Buses: Combination Propane Operated Utility Plant: Use in Internal Combustion Engines: Design & Installation of Storage: Supply from Petroleum Refineries: Engineering Data on the Lower Olefins: Domestic Appliance Testing and Utilization: Economical Comparisons with Coal, Oil, Electricity, Producer Gas, Manufactured Gas: Town Plants: Manufacture from Natural Gas: Special Uses: Volume Correction Factors: Transportation: Use with other Gases: Analysis & Testing: Properties of Mixtures: Bottled Gas Distribution: Bibliography: Central Plant Directory: Catalog Section.

SECOND EDITION (Revised November, 1938) **$5.00** *Plus Postage*

We pay the postage on orders accompanied by remittance

Published by Western Business Papers, Inc., publishers of

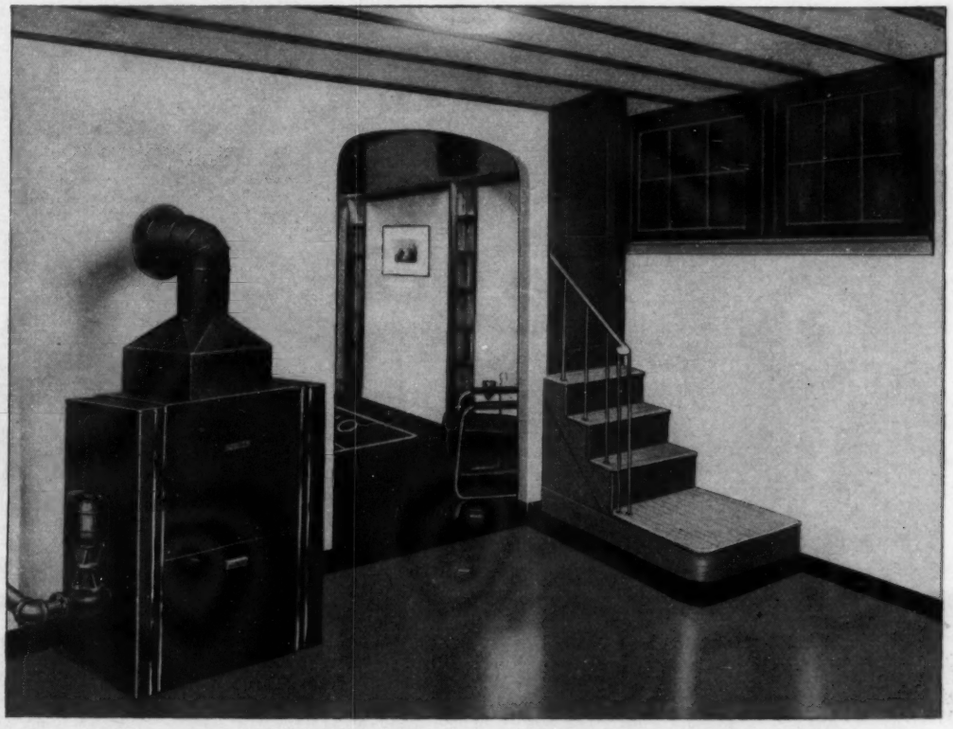
GAS

The NATIONAL Gas Magazine

OIL & GAS Equipment Review, 810 S. SPRING ST. Los Angeles, Calif.

PITTSBURG *Gasfired* HOUSE HEATER

A Scientific Development in Hot Water Heating Systems



A UNIVERSAL HEATER

The "Pittsburg House Heater" will fill more universal demands than any other house heater on the market. This house heater is adaptable to any size rating up to 150,000 B.T.U. input.

You have only one size to stock, which reduces your inventory, means quicker turnover, less overhead, quicker sales, increased volume, greater profit.

When the capacity of the heater is greater than your requirements, remember the heater only uses that quantity of gas necessary to replace the heat loss of the residence, therefore it is not necessary to build and carry in stock more than one size, that size being the one built to burn and operate at its maximum efficiency.

INSTANT AND CONSTANT HEAT

With a closed system and forced circulation such as used in a "Pittsburg House Heater," you have all the advantages of instantaneous heat. In a house of 5 or 6 rooms, when using the proper type of radiators, the entire water in the System will pass through the Heating System every three minutes. This feature gives even distribution of heat at all times—there is no waiting for rooms to be heated.

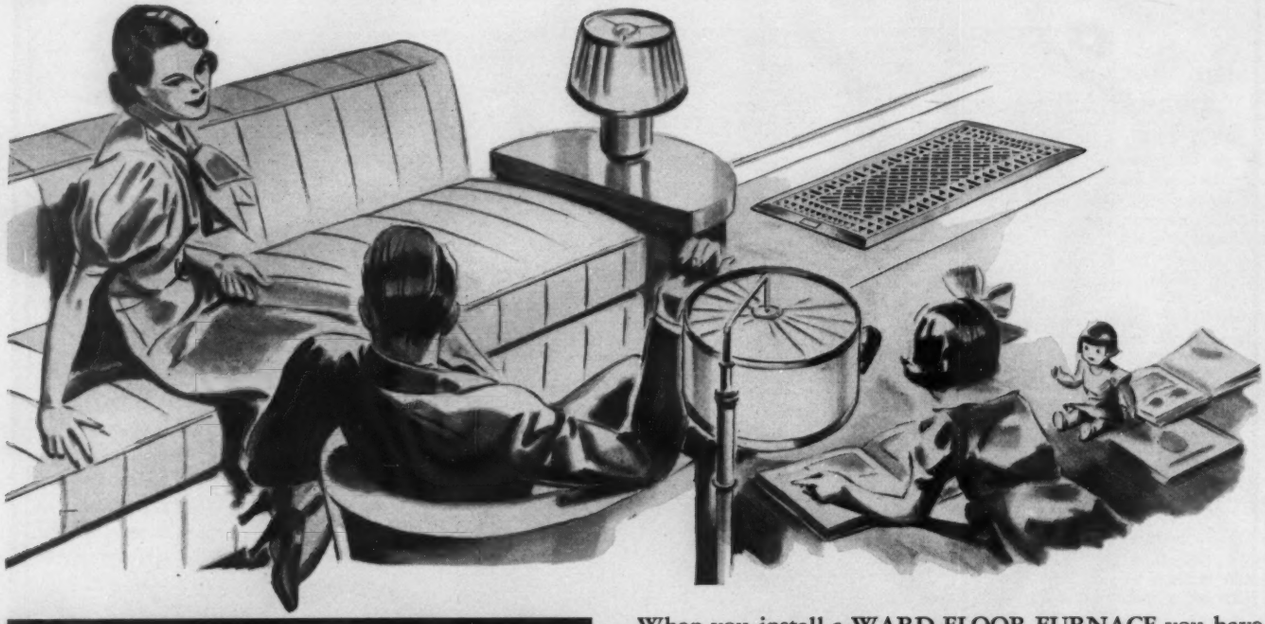
"Pittsburg House Heaters"—designed to provide perfect radiator heat—will burn all gases—natural, manufactured, mixed, liquefied petroleum, efficiently and effectively. Built for safe—sure—simple operation. Equipped with Controls to insure carefree, effortless, automatic heat. Specify kind of gas when ordering.

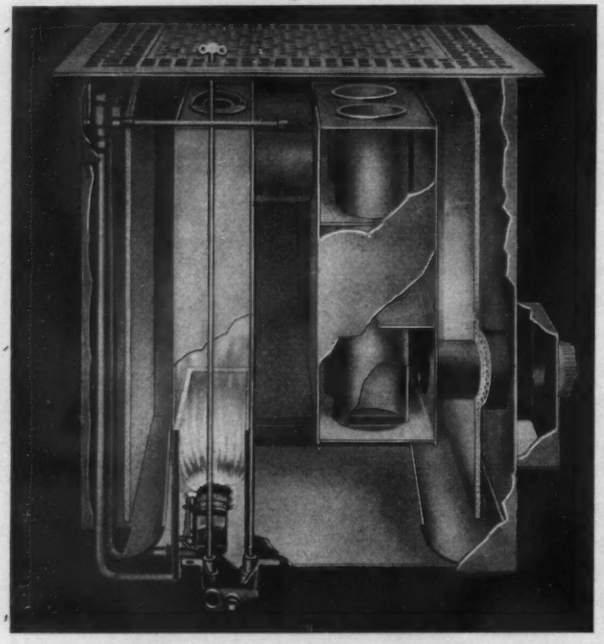
Send for complete details

THE PITTSBURG WATER HEATER CORPORATION

PITTSBURGH, PA.

YOUR *LOAD* and their *comfort* are *safe* and *certain* with a WARD





When you install a WARD FLOOR FURNACE you have the satisfaction of knowing that you have provided that home owner the best in modern gas heating equipment. More than that, WARD'S dependable performance wins you lifelong friends for gas as the ideal fuel for space heating.

A WARD FLOOR FURNACE is a permanent load building asset on your lines. Guaranteed for ten years, it "stays put" for a lifetime of controlled winter comfort. Its automatic features... *Bilt-in Thermo-Control, Cradle Circulator, Safety Pilot*... regulate temperature accurately, use fuel economically, distribute warmth healthfully, protect the house positively.

Your consumer judges your gas by the way the appliance you sell performs. That's why so many utilities find it profitable to feature the WARD FLOOR FURNACE.

WARD FLOOR FURNACE

May we send you our latest catalog?

WARD HEATER COMPANY...LOS ANGELES

QUICK AND EASY TO INSTALL

The WARD FLOOR FURNACE is completely self-contained. There are no external controls or accessories. Ward Bilt-in Thermo-Control is part of the furnace, regulated by an indicator in the corner of the register. This makes installation simple. Just drop the complete furnace into the floor opening... connect to vent and gas line... and it's ready for action! *You don't have to hire an electrician to help install a WARD Floor Furnace.*

FACTORY REPRESENTATIVES

A. S. KINCAID, 2012 North Harwood, Dallas, Texas
J. H. STUBBINS, 300 East 68th Terrace, Kansas City, Missouri
H. C. SANDERSON, 207 Fulton Building, Pittsburgh, Pennsylvania
W. D. ROBERTS, 468 Peoples Gas Building, Chicago, Illinois
LEON M. TAYLOR, 3200 Main Street, Dallas, Texas

Supply Men's Engineering Fellowships To Be Awarded

E. H. POE, secretary of the Natural Gas Section of the A.G.A., has recently announced that selections will soon be made for the Natural Gas fellowships at the University of Oklahoma and Pennsylvania State College for postgraduate research work in natural gas engineering. The fellowships are awarded by the Natural Gas Supply Men's Fund Committee to two candidates selected each year, providing them with $500 for expenses. Candidates must be graduates of accredited colleges or universities and must be related to someone already engaged in the natural gas industry.

The fund has been in existence since before the old Natural Gas Association of America merged with the A.G.A., when the former body was closely associated with the Natural Gas Supply Men's Association. The supply men's organization disbanded, however, when the Natural Gas Department of the A.G.A. was formed. The $17,000 in the supply men's treasury was turned over to the A.G.A. with the stipulation that the income be used for educational purposes. To this amount the Natural Gas Association of America contributed $10,000.

The Natural Gas Supply Men's Fund Committee is at present composed of George E. Welker, chairman, United Natural Gas Co., Oil City, Pa.; J. D. Creveling, Panhandle Eastern Pipe Line Co., New York; and N. C. McGowen, United Gas Pipe Line Co., of Houston.

■ ■

L. J. Mueller Furnace Co. Increases Eastern Facilities

L. J. Mueller Furnace Co., Milwaukee, Wis., announces the increase of Eastern facilities to meet the demands of the trade, jobbers and utilities along the Atlantic Seaboard.

Branches are maintained in Baltimore, Philadelphia and Pittsburgh, where complete stocks of Mueller line are carried at all times, including the company's newest product—prefabricated duct and fittings.

The Baltimore office and branch is in charge of C. L. Hewitt, Jr., eastern sales manager. The Philadelphia branch, in charge of John G. Werner, serves not only the Metropolitan Philadelphia area, but also Eastern Pennsylvania, Delaware and the State of New Jersey. The Pittsburgh branch under the direction of R. A. Warner is located at 20th and Wharton, South Side.

■ ■

Thatcher, Ariz., Council Sponsors Natural Gas Plan

As the result of a resolution adopted by the Thatcher, Ariz., city council, a special election has been called for September 9 to give the citizens an opportunity to pass approval on the proposed franchise which would grant to the Duncan Utilities Co. the privilege of constructing and maintaining a natural gas system in Thatcher. The Duncan Utilities Co. handles and maintains all mainline tap privileges for Graham County for the El Paso Natural Gas Co., it is stated.

■ ■

Wayne, W. Va., Buys System

Permission to purchase the distribution system in the town of Wayne, W. Va., from the Southern West Virginia Oil and Gas Corp. has been granted the Wayne Gas Co. by the Public Service Commission of West Virginia. The Southern West Virginia company will continue to furnish gas to the city.

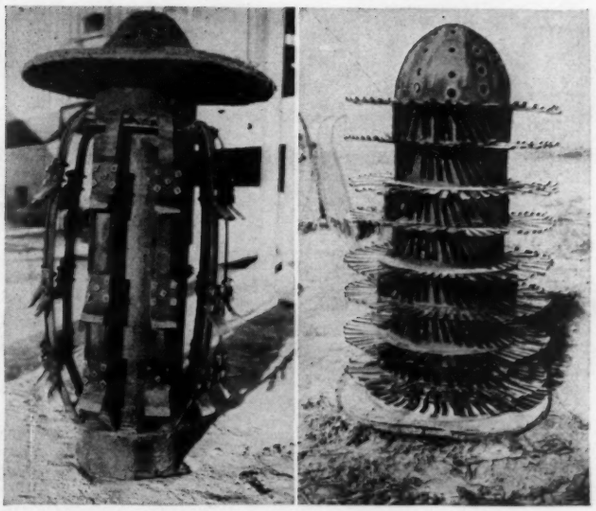


FIG. 1 (at left): Scarifier, showing hard-faced blades.

FIG. 2 (at right): "Go-devil" cleaner with hard-faced steel fingers.

Gas Propelled Cleaners For Scouring Pipe Lines

WHEN an overland pipe line* for high-pressure gas transmission accumulates dirt, the job of cleaning it assumes no mean proportions. Hundreds of pounds of mud, rust, and dust may be lodged in a section only a few hundred yards long and in some cases such deposits of foreign material have reduced the carrying capacity of lines by as much as 25 per cent.

An ingenious method is used to clean long lines. Scarifiers and "go-devils," consisting of cylindrical bodies to which are fastened radial projecting blades or spring steel strips, are blown by gas pressure through the section of the line to be cleaned. The more rugged scarifier is used first to dislodge oily mud and caked dust, then the cleaner with spring steel fingers is blown through to remove any remaining material.

After considerable testing, K. N. Fancher, of the Northern Natural Gas Co., Omaha, Neb., developed a scarifier of the type shown in Fig. 1 for breaking the hard, caked dust and oily mud in a 24-in. line. As can be seen from the illustration, the body or core of the scarifier is a section of 10-in. pipe, one end of which has been fabricated by oxy-acetylene heating and welding into an orange-peel head with holes to allow gas to flow through and blow out loose accumulations. Around the body are fastened springs to which are bolted hard-faced steel blades. A further refinement is the large diaphragm of belting which closely fits the internal area of the pipe to assure a good gas seal.

The cleaner which follows the scarifier is shown in Fig. 2. The core of this cleaner is made of approximately 4 ft. of 12¾-in. diameter pipe, bull-plugged at one end and having several circular double rows of spring steel fingers along the length of the core. All the fingers were hard-faced with Haynes Stellite alloy by the oxy-acetylene process. The diaphragm was manufactured from a heavy ditching machine conveyor belt backed up with a thin, circular iron sheet.

Under normal conditions, the scarifier and cleaner can be blown through the 24-in. pipe with 3 to 10 lbs. per sq. in. gas pressure, but if held up for any reason, the pressure can be increased as necessary to force the cleaner past almost any obstruction. When traveling through the pipe satisfactorily, the cleaner attains a speed of 3 to 5 miles per hour. Continuous sections of 24-in. pipe, 5½ miles long, have been cleaned successfully. Two trips of the scarifier and one or two trips of the cleaner have been found to make the inner pipe wall bright and shiny even in low spots where the dirt accumulation was heavy. The increase in gas-carrying capacity after cleaning is readily apparent.

*Reprinted from the July 1939, issue of *Oxy-Acetylene Tips*, published by The Linde Air Products Co., New York, N. Y.

■ ■

William Saville Passes

William Saville, since 1919 general secretary of the B. C. Electric Railway Co., Vancouver, B. C., passed away July 23. He was 65 years of age. Mr. Saville first affiliated with the company in 1911 as a member of the accounting staff, and in 1917 was made comptroller.

INDUSTRY *Personalities*

L. F. Bischel, formerly in the Dickinson, N. D., office of the Montana-Dakota Utilities Co., has been transferred to Bismarck, where he will replace W. J. McDonald as sales manager for that division.

Carl Watson, manager of the Springdale, Ark., office of the Arkansas Western Gas Co., has been transferred to Siloam Springs, where he will manage the company's Siloam Springs and Gentry districts. Mr. Watson is replaced at Springdale by **Earl Gibson,** formerly in the Rogers, Ark., office.

John Elmer Harris, Ute Dome, New Mexico, field man for Southern Union Gas Co., Dallas, Texas, has been awarded the company's Ten Year Service Pin for his unbroken service record since June, 1929. Mr. Harris is the eleventh employe to receive this honor.

Promotion of **W. H. Wheeldon** of Ranger to the position of assistant superintendent of gasoline plants for Lone Star Gas Co., effective August 15, has been announced by Elmer F. Schmidt, vice president and operating manager for the company. Mr. Wheeldon succeeds **Paul Coffin,** who has resigned to become general superintendent for the Shamrock Oil & Gas Co., with headquarters at Amarillo.

J. M. Kindle, superintendent of Lone Star's gasoline plant at Trinidad, has been named to succeed Mr. Wheeldon as superintendent of gasoline plants in the gas system's West Texas district, with headquarters at Ranger.

Mr. Wheeldon had been superintendent in the West Texas district since 1931. Mr. Coffin had been with Lone Star since 1922, beginning as laboratory man at Petrolia.

Fenton Kelsey, president of the Fenton Kelsey Co., has announced the opening of a New York office and the appointment of a Los Angeles representative.

H. P. Jenks, who has been associated with the company for the last two years, is opening the New York office on September 1 at 342 Madison Avenue. **L. L. Crahan,** associated with public utilities for over 15 years, has been appointed to cover the southern part of California. His office is at 1621 So. Grand Ave., Los Angeles, California.

The Chicago office of the company was changed from 122 So. Michigan Ave. to 43 East Ohio St.

Ray J. Thompson, field foreman for the Oklahoma Natural Gas Co. at Owasso, Okla., may be awarded a Carnegie medal and the president's medal for saving the life of a Sapulpa girl, who nearly drowned in the river. Mr. Thompson applied artificial respiration after the girl was declared dead.

A. C. Geldner has been promoted to district sales manager at Los Angeles for Republic Steel Corp., Cleveland. Mr. Geldner joined Union Drawn Steel Co. in 1920 as a salesman in its Cleveland office, and continued in that capacity until 1928, when he was made Cleveland district sales manager. In 1932 he was transferred to Los Angeles and two years later became district sales manager of Union Drawn Steel Co., which post he held until early 1939, when he was appointed assistant district sales manager for Republic Steel Corp., replacing Geo. E. Clifford.

A. C. GELDNER

W. H. (Hal) Noble, for the past 13 years with Ducommun Metals and Supply Co., Los Angeles, has joined the sales force of Republic Steel Corp., Los Angeles office.

R. W. McClure, president Oklahoma Power and Water Co., which supplies electric, gas and water service in several Oklahoma cities and towns, including Sand Springs, has been transferred to the Kansas Electric Power Co., with headquarters at Lawrence, Kansas. He will be succeeded in Oklahoma by **J. C. Happenny,** formerly of Springfield, Ill.

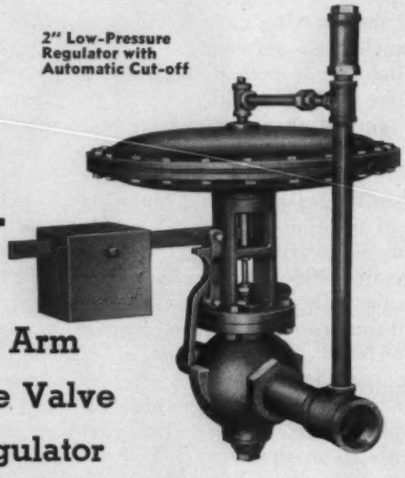
A. K. Dickson, purchasing department, San Joaquin Power Division, Pacific Gas and Electric Co., Fresno, Calif., has been elected commander of the Selma American Legion Post. He has also been appointed delegate to the tri-county council.

R. C. Denny, chief dispatcher, San Joaquin Power Division, Pacific Gas and Electric Co., Fresno, Calif., has received the *Home Movie* magazine's award for the best "movie of the month" for his "Alaskan Cyclorama," a movie of his trip to Alaska last year. The film is entirely in color, and titles were written by Mr. Denny.

O. L. Dickinson, gas superintendent, northern division of Pacific Gas and Electric Co., Fresno, Calif., was in charge of distributing contest blanks for the annual Pacific Coast Gas Association employe contest which closed August 1. A total of $475 cash was offered for the contest, the subject of which was the CP range.

Milton L. Kapp has been appointed assistant to the president of the Interstate Power Co. of Dubuque, Iowa. Mr. Kapp was formerly vice president and director of the Michigan Public Service Co. and prior to this was with the Oklahoma Natural Gas Co.

2" Low-Pressure Regulator with Automatic Cut-off



EASY—

- to Position Lever Arm
- to Remove Inside Valve
- to Dismantle Regulator

All C-F Low-Pressure and Medium-Pressure Regulators are built with flanged upright bolted on, for easy detachment and renewal of valve seats. This important convenience, long familiar to users of larger-size C-F equipment, is now standard on C-F Regulators of whatever size. Ask for Catalog.

The CHAPLIN-FULTON MFG. CO.

28-40 PENN AVE. CF PITTSBURGH, PA.

JOHN ZINK BURNERS

You Can't Beat a JOHN ZINK FLOOR FURNACE *for:*

EFFICIENCY—It has a long combustion chamber that does not get red hot—the full length Burner and large air passages insure large quantities of uniform warm air throughout the room. Our tests show 75% efficiency.

QUIETNESS—Due to its construction it is perfectly quiet when heating up or cooling off.

DURABILITY—The combustion chamber is made of 18-gauge steel. The air hood and furnace body are made of 22-gauge galvanized steel.

ECONOMY—There is no other means of heating a house so efficiently at such low cost as with a floor furnace.

THREE SIZES

25,000 B. t. u. 50,000 B. t. u.
70,000 B. t. u.

JOHN ZINK BURNERS—Tulsa-New York

Tulsa Plant – 4401 South Peoria Ave.

New York—342 Madison Ave.

Louis J. Blevens, formerly sales supervisor at the Arkansas City, Kan., office of the Kansas Gas and Electric Co., has been transferred to Independence, according to an announcement by C. B. Tingley, district manager. **Leonard Adler** will take the position left vacant by Mr. Blevens.

A. E. Grauer, formerly director of social science at the University of Toronto, has been appointed general secretary of the B. C. Electric Railway Co., Vancouver, B. C. At one time Mr. Grauer made a study of the Canadian tax structure for the Bank of Canada, and in 1937 and 1938 was attached to the Rowell commission as expert on labor legislation and social services.

L. E. Ingham, Kentucky Natural Gas Corp., Owensboro, Ky., has been appointed vice president. Mr. Ingham recently resigned from his position with the Michigan Gas Transmission Corp. to become assistant to the president of Kentucky Natural.

Christine Vinson, secretary to N. J. Kroencke, manager of the Arkansas Louisiana Gas Co., Texarkana, Ark., won an essay contest conducted recently by the company for all Texarkana employes. The subject of the essay was "What the Customer Expects of His Gas Company." **E. D. Stout** and **Wayne Wood** won second and third places respectively.

Eleven employes of the Philadelphia Co., Pittsburgh, and subsidiary companies were awarded degrees or certificates recently after completion of their courses at Duquesne University, Carnegie Institute of Technology, and the University of Pittsburgh. The gas company employes so honored are: **John B. Benkert**, production and transportation department, Equitable Gas Co., Pittsburgh; **William J. Lancaster**, adjustment department, Philadelphia Co.; **Kenneth H. Charlesworth**, adjustment department, Philadelphia Co.; **D. Leonard Demmy**, sales and service, Philadelphia Co.; and **Herbert J. Smith**, telephone department, Equitable Gas Co.

Charles W. Polzer has been appointed manager of the San Diego (Calif.) Consolidated Gas Co.'s new North Park office in the city of San Diego.

Guy Custer, formerly in the Dallas, Texas, office of Community Natural Gas Co., has been transferred to Abilene where he will be sales supervisor for that division, it was announced recently by M. L. Bird, division superintendent of Community Natural. Mr. Custer will supervise new business and merchandising in all West Texas towns served by the company.

Westel Morsman, manager of the Gas Service Co. at Falls City, Neb., has recently announced his resignation from the company's service. He had been with the Falls City branch for 10 years.

Oakah L. Jones, assistant treasurer of the Oklahoma Natural Gas Co., Tulsa, Okla., has been nominated for president of the new board of directors of the Tulsa Institute of Governmental Research.

Ruth Brown, Columbus, Ohio, has been appointed home service representative of the Ohio Fuel Gas Co.'s Toledo district. Miss Brown was graduated from the home economics department of Ohio State University.

WHO WILL BE NEXT?

For accepted and published captions to the "Dotted Line Roscoe" Cartoon, published below, GAS will pay $5.00. Address GAS, 810 South Spring St., Los Angeles, Calif. This month's winner is **Paul B. Wagner**, The Ohio Fuel Gas Co., Fostoria, Ohio, and a check for $5.00 is on its way.

Dotted Line Roscoe

Get some autographs on orders, or don't come back.

Paul E. Nicholls, manager of the Galveston branch of the Texas Cities Gas Co., observed in August the thirtieth anniversary of his service with the company. Mr. Nicholls was employed by the company in 1909 after his graduation from the University of Texas.

The Galveston branch observed in August, also, its eightieth year of gas service.

William H. Park, manager of commercial, industrial, and agricultural power sales for the Pacific Gas and Electric Co., San Francisco, has been appointed district manager of the company in Berkeley. Mr. Park succeeds the late Henry Beekman.

W. A. Fisher, employed in the treasury department of the Lone Star Gas System, Dallas, Texas, celebrated his eightieth birthday August 27. He has been with the Lone Star System for 14 years, and is active as assistant secretary of five Lone Star companies.

H. V. Smith, district manager of Community Natural Gas Co. at Taylor, Texas, has been appointed chairman of the Taylor Traffic Safety Committee, whose purpose is to promote safe driving.

Ralph Weir, manager of the Gas Service Co., Parsons, Kan., has been appointed by Governor Ratner to the State Planning Board. The Board directs surveys and research work for public service projects.

W. H. McInnis, formerly general sales manager of the Memphis Power and Light Co., Memphis, Tenn., has been appointed to the staff of the sales department of Ebasco Services, Inc., New York City.

J. O. Schuyler has recently been appointed manager of United Gas Corp., Vernon, Texas.

Charles J. Jenkins, formerly manager of the Neosho, Mo., office of the Gas Service Co.,

BUTANE-PROPANE *News*

THE CLEARING HOUSE FOR NEWS AND INFORMATION ABOUT . . .

Transportation and Storage
Safety Practices
Industrial and Standby Uses
Bottled Gas Distribution
Semi-Bulk Distribution
Dealer Sales and Service
New Appliances and Equipment
Internal Combustion Engines
Town-Plant Operation and Load Building
Etc., Etc., Etc., Etc.

BUTANE-PROPANE News

810 South Spring Street, Los Angeles, Calif. _____ **1939**

Please enter my name as a subscriber to BUTANE-PROPANE News.

Checked enclosed_____
Send bill to:

Name_____ **Position**_____

Company_____

Street **City** **State**

SUBSCRIPTION RATES—United States, Canada, Mexico, Cuba, South and Central American Countries, three years for $2.50. All other countries, $3.00 per year.

LOWERED NIGHT TEMPERATURE *in a..* LOW PRICED *Control Set*

Y78 TIME-O-STAT GAS PACKAGE

Y26 DA-NITE ACRATHERM GAS PACKAGE

A Series 10 Circuit set which provides both lowered night temperature and the famous Heat Accelerating feature of the Da-Nite Acratherm.

THE STANDARD OF THE INDUSTRY

THE Time-O-Stat Gas Regulator package, shown left above, provides lowered night temperature in a true economy gas control set. It consists of a silent solenoid gas valve, transformer, T801A Time-O-Stat and all necessary fittings. This set permits night temperature to be controlled at any point between 45° and 55° F, with automatic return of day temperature at any time within eleven hours.

The Time-O-Stat Gas Package is a fuel saving control set at a price heretofore believed impossible – yet M-H quality throughout . . . Other gas control sets are available to meet every need, and priced accordingly.

Minneapolis-Honeywell Regulator Company, 2946 Fourth Avenue South, Minneapolis, Minn. Branches and distributors in all principal cities.

AUTOMATIC CONTROLS MH

MINNEAPOLIS HONEYWELL

Control Systems

BROWN INDUSTRIAL INSTRUMENTS
NATIONAL PNEUMATIC CONTROLS

has been transferred to Merriam, Kan. Mr. Jenkins will be replaced at Neosho by **E. R. Bartlett** of the Merriam office.

George F. Peck, Jr., for 11 years office manager of the Community Natural Gas Co. at Temple, Texas, has been appointed district manager for the company with headquarters at Terrell, Texas. Mr. Peck replaces **Joe Darrow**, who has been transferred to Brownwood.

Earl Gibson, formerly service man for the Rogers, Ark., branch of the Arkansas Western Gas Co., has been appointed manager of the Springdale office. **Arnold Christie** of the Fayetteville office will replace Mr. Gibson at Rogers. **Carl Watson**, Springdale manager, has been transferred to Siloam Springs to succeed William McMichael, who recently resigned.

N. C. McGowen, president, United Gas Pipe Line Co., Shreveport, La., has been appointed to the A. G. A. committee on supply men's fund, filling the place of Samuel W. Meals, deceased. The supply men's fund is used to finance graduate fellowships for relatives or members of families associated with the natural gas industry, and was originally started by the old Natural Gas Association of America.

Joseph J. Welsh, New York and Richmond Gas Co., Stapleton, S. I., has been elected president of the Staten Island Rotary Club.

Howard Loose and **Alvah Welch**, both of the customers' service department of the Philadelphia Gas Works Co., Philadelphia, were recently presented McCarter medals and certificates for life saving by the Schafer prone pressure method of resuscitation. The McCarter awards are made by the accident prevention committee of the A. G. A.

Newcomb K. Chaney, director of research of United Gas Improvement Co., Philadelphia, Pa., was recently presented the Howard N. Potts Medal which is awarded for distinguished work in science or mechanic arts. Dr. Chaney invented the gas mask carbon used during the World War and now used commercially for recovery of valuable solvents from the air.

W. H. Haupt, president, Acme Drilling Co., Coudersport, Pa., has been elected president of the Pennsylvania Natural Gas Men's Association. **George Wittmer**, Jr., president, American Natural Gas Co., Pittsburgh, was elected vice-president, and **B. H. Smyers**, Jr., Pittsburgh, secretary-treasurer.

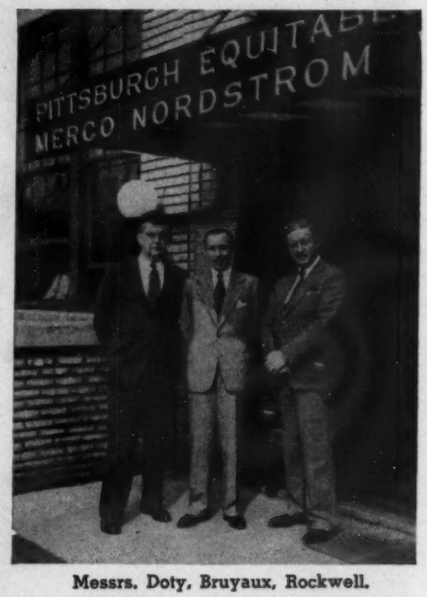
John M. Ruegenberg, superintendent of the Northern Liberties Gas Co., Philadelphia, Pa., recently retired from active service with the company.

Charles J. Guenther, special accountant with The United Gas Improvement Co., Philadelphia, Pa., retired recently after 37 years of service.

J. G. Montgomery, superintendent of production, and **P. R. Mullin**, superintendent of distribution.

A. C. Burwell, superintendent of compressor stations for the United Natural Gas Co., Oil City, Pa., was recently presented with the president's trophy in recognition of his department's safety record. The presentation was made by George E. Welker, president of United Natural.

State Department of Labor and Industry certificates of honor for perfect safety records in 1938 were also awarded Mr. Burwell.



Messrs. Doty, Bruyaux, Rockwell.

Pittsburgh Equitable Meter Appoints European Agency

Colonel W. F. Rockwell, president of Pittsburgh Equitable Meter Co., Pittsburgh, has announced the appointment of the Anthony Bruyaux Co., Brussels, Belgium, to be sales agents for Pittsburgh Equitable products in Belgium, Holland and France.

This company already handles the sale of valves for the Merco Nordstrom Valve Co., a Pittsburgh Equitable subsidiary. Mr. Bruyaux, head of the firm, is well known throughout industrial Europe, and stated that in addition to his present staff, a new and larger organization will be created to serve the industries interested in the complete line of Pittsburgh Equitable products.

The above picture, taken at the main offices of Pittsburgh Equitable Meter Co. and Merco Nordstrom Valve Co., Pittsburgh, shows (left) George Doty, export manager; (center) Anthony Bruyaux; (right) President Rockwell.

■ ■

F. S. West Featured Speaker At S.C.M.A. Meeting

The August meeting of the Southern California Meter Association. held in Huntington Park on August 24, featured a paper entitled "Use of the Orifice in Respect to Gasoline Plant Control," by F. S. West, engineer of the Texas Co., Natural Gasoline Division. The three purposes of meters in gasoline plant operation were covered in Mr. West's address by the topic heads "Measurement, Engineering Data and Control."

The membership of the Association is being queried by J. Dunn, Los Angeles, to determine whether or not a tournament shall be held for badminton, golf or tennis.

■ ■

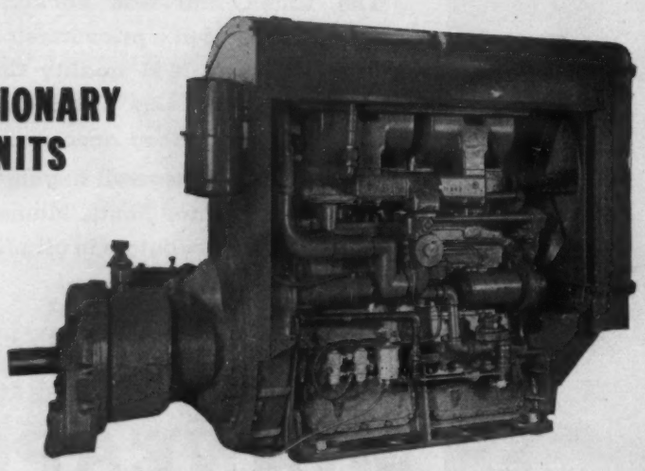
Census Reports Show Gas Safer Than Electricity

The United States Census Reports, over a period of years, show an irregularly declining number of accidental deaths from gas asphyxiation, and an irregularly increasing number of accidental deaths from electric current (other than industrial accidents).

For the past two years, 1936 and 1937 (1938 figures will not be available before 1940), the accidental deaths from electricity have exceeded substantially those from gas.

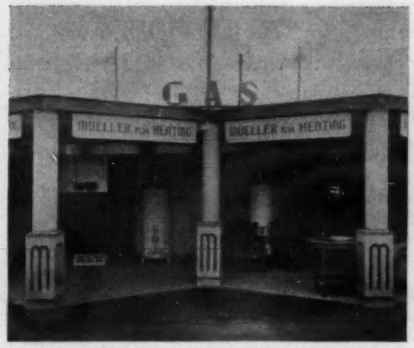
ENSIGN CARBURETION EQUIPMENT

FOR STATIONARY POWER UNITS



Suitable for use with Natural or Manufactured Gas. ENSIGN Gas and Combination Gas and Gasoline Carburetion Equipment is standard with all leading engine manufacturers.

ENSIGN CARBURETOR CO., LTD.
LOS ANGELES · DALLAS · CHICAGO



Mueller Furnace display at the Portland (Ore.) National Home Show.

Mueller Displays "Levelizer" At Portland Home Show

Among the many domestic exhibits at the National Home Show held at Portland, Ore., was the above display by Mueller Furnace Sales Co., Portland, which featured gas and Mueller gas-fired heating and air conditioning equipment. One of the highlights of the display was the actual firing demonstration of the new Mueller Heat Levelizer. Visitors were witnesses to the performance of this new Mueller invention which automatically regulates the gas flame up and down, not on and off, thus assuring a constant supply of uniform warmth throughout the home with no cold spots or temperature variations. The Heat Levelizer regulates the flame from full to as low as 10 per cent. It automatically balances the size of the furnace to the heating requirements of the home.

■ ■

Southern Union Co. Sponsors "Shirt Sleeves" Campaign

A 15-day "shirt sleeves" campaign for the sale of heating equipment was completed July 31 by employes of the Southern Union Gas Co., Dallas, Texas, who were urged to roll up their sleeves and go to work.

During the period of the campaign purchasers of heavy heating equipment were given the five per cent discount which the company saves on summer installation.

The contest held in connection with the campaign provided that salesmen receive regular commissions plus $2 special award for all sales of floor furnaces, central furnaces, unit heaters and conversion burners. Employes obtaining and interviewing the prospect who purchased heating equipment received $2 for each unit sold.

■ ■

Oklahoma Natural Gas Co. Announces Refinancing Plan

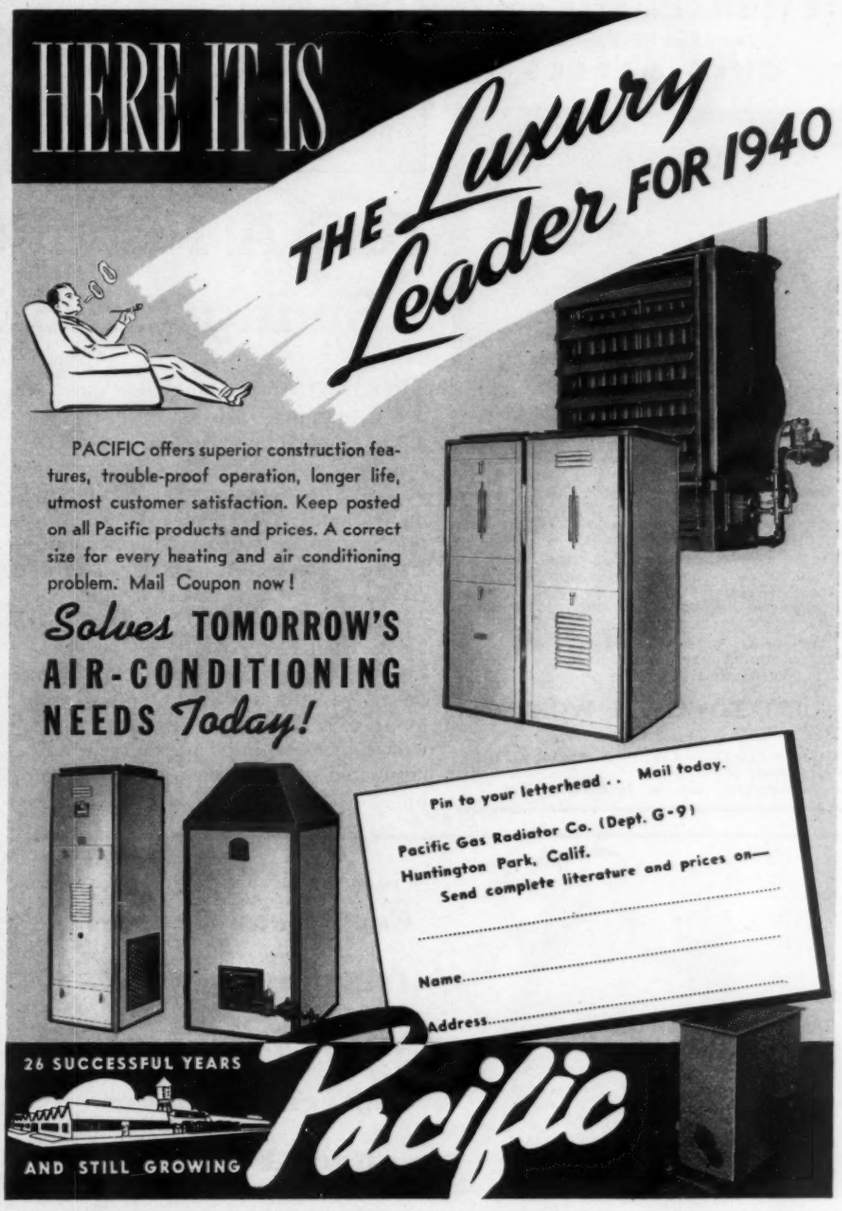
Joseph Bowes, president of the Oklahoma Natural Gas Co., Tulsa, Okla., has announced that his company has decided upon a refinancing plan that involves $29,000,000 and which, if successfully consummated, will result in substantial savings to the company in fixed charges, according to news reports.

The New York investment house of Stone and Webster and Blodgett is said to be the principal underwriter.

■ ■

New York Gas Man Dies

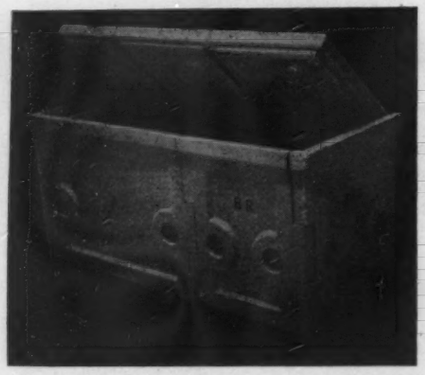
James J. Murphy, 73, formerly superintendent of manufacture of the Iroquois Gas Corp., Buffalo, N. Y., died July 25. He had been in the gas industry's service 40 years.


HERE IT IS
THE Luxury Leader FOR 1940
PACIFIC offers superior construction features, trouble-proof operation, longer life, utmost customer satisfaction. Keep posted on all Pacific products and prices. A correct size for every heating and air conditioning problem. Mail Coupon now!
Solves TOMORROW'S AIR-CONDITIONING NEEDS Today!
Pin to your letterhead . . Mail today.
Pacific Gas Radiator Co. (Dept. G-9)
Huntington Park, Calif.
Send complete literature and prices on—
Name
Address
26 SUCCESSFUL YEARS
AND STILL GROWING
Pacific

Mueller Flor-Aire Gas Furnaces for Small Homes give you an edge on competition . . . there's more to sell.

L. J. MUELLER
FURNACE COMPANY
MILWAUKEE

ART CONCRETE
SECTIONAL METER BOXES
The Ideal Housing for
CURB METERS



Thousands used by the Pacific Coast's largest gas companies. Patented, extensible boxes which may be lengthened without removal. Knock-outs are provided for pipe connections.

Furnished in combinations suitable for single and multiple set-ups, high and low pressure. New types developed for special conditions, such as our latest box just designed with superimposed covers.

Also, several sizes of round curb valve boxes fitted with breakaway grooves for varying depths and breakaway slots.

ART CONCRETE WORKS
Originators and Manufacturers
366 South Fair Oaks Ave. . . . . Pasadena, Calif.
2400 Adeline Street . . . . . Oakland, Calif.
Birmingham, Ala. • Jacksonville, Fla.

TABLE NO. 1. FOUR-YEAR COMPARISON OF NATIONAL ADVERTISING

	1936-37	*1937-38*	*1938-39*	*1939-40*
Participating Companies	694	717	708	718
Meters in Service	11,369,414	11,050,000	11,161,483	11,501,727
Subscriptions	$454,776.00	$442,000.00	$456,962.22	$466,984.08
Magazines Used	26	32	32	29
Number of Insertions	188	207	218	267
Total Circulation	13,770,394	18,442,000	17,466,843	17,768,942

A. G. A. National Advertising Swings Into Fourth Year

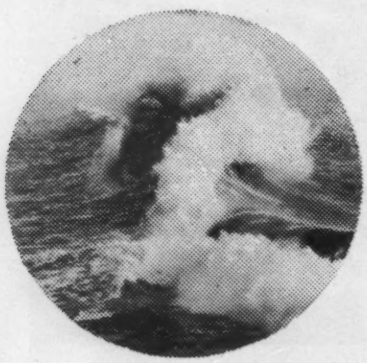
BEGINNING this month the National Cooperative Advertising Program of the American Gas Association swings into its fourth year under the guidance of T. J. Strickler, chairman, Committee on National Advertising. A glance at the September issues of the *Woman's Home Companion* and the *Ladies' Home Journal* will reveal in four colors that "Today 16,000,000 Women — More Than Ever Before — Are Cooking With Gas!" And these September advertisements are but the advance guard of a 12-months' campaign which will embrace an imposing list of widely circulated publications offering a combined circulation of 17,768,942. Others on the list include the *Saturday Evening Post, Good Housekeeping, McCall's, American Home,* and *Better Homes and Gardens.* In addition, several trade publications will be used. McCann-Erickson, Inc. of New York is the agency.

Convinced that the campaigns of the past three years have brought fine returns in better industry morale, an upturn in the per customer use of gas, a stimulation of appliance sales, wide knowledge of the value and importance of the CP range, and have impressed upon the public mind the prestige due the gas and gas appliance industries, the committee feels that the coming year will see renewed effort to aid salesmen and dealers in replacing the 10,000,000 obsolete ranges.

Analyses of past advertising have revealed that "the copy which included modern kitchen illustrations ranked highest in consumer observation and attention. The news type of headline was highest in headline leadership. Four-color advertisements in the 1936-1937 campaign got sufficient increased observation to justify the added expense of four-color copy as distinct from two-color copy."

The Association attaches great importance to a consumer check-up made by an independent research organization to determine changes in the attitude of housewives towards gas and gas ranges since the program was originally started. It was found that women who already use gas are much more loyal to its advantages than they were two years ago, and that they understand and are far more appreciative of the features of CP gas ranges.

Cuing the new program upon the findings of those of the past three years (Table No. 1), the committee will make use of four colors, simplification of layout treatment, high-lighted facts regarding the modernity of gas and gas equipment, modern kitchen illustrations and the important operating features of CP gas ranges. The



Cool Ocean Breezes
Invigorating Air
Sports of All Kinds
Big Trees at Your Back Door

ALL THESE AND MORE ARE YOURS AT SANTA CRUZ!

You will find this an ideal spot in which to spend a vacation—a glorious place in which to live!
Stop on your way to or from the Convention—it will be an ideal "rest spot", either before or after you go to Treasure Island!

SANTA CRUZ—*Home of the General Offices of*
COAST COUNTIES GAS AND ELECTRIC COMPANY

word "Gas" will be boldly displayed in all headlines as well as in the body copy, and every advertisement will contain the phrase "Gas serves you better through modern gas appliances." Other uses for gas than cooking will not be forgotten and ads will always carry the lines, "Use gas for the four big jobs — cooking, water heating, refrigeration, house heating."

95 Million Color Messages

In all, the 1939-1940 program will result in sending into American homes 95,765,000 full color messages through the consumer magazines, and in them will be emphasized: "Gas gives double-quick broiling. Gas gives oven heat control. Triple improvement in top burners. Cost of cooking lowered by modern gas ranges. The cooler, cleaner methods of gas cooking. Gas gives quickest, highest, steadiest heat."

In industrial and commercial advertising which will be undertaken for the coming year the fields to be covered through their respective publications are the metal trades, food, hotels and restaurants, ceramics, beauty shops, hospitals, and printing and publishing. This advertising is supervised by the Advertising Committee of the A.G.A. Industrial Gas Section, with Ketchum, MacLeod & Grove, Inc., Pittsburgh, serving as agency.

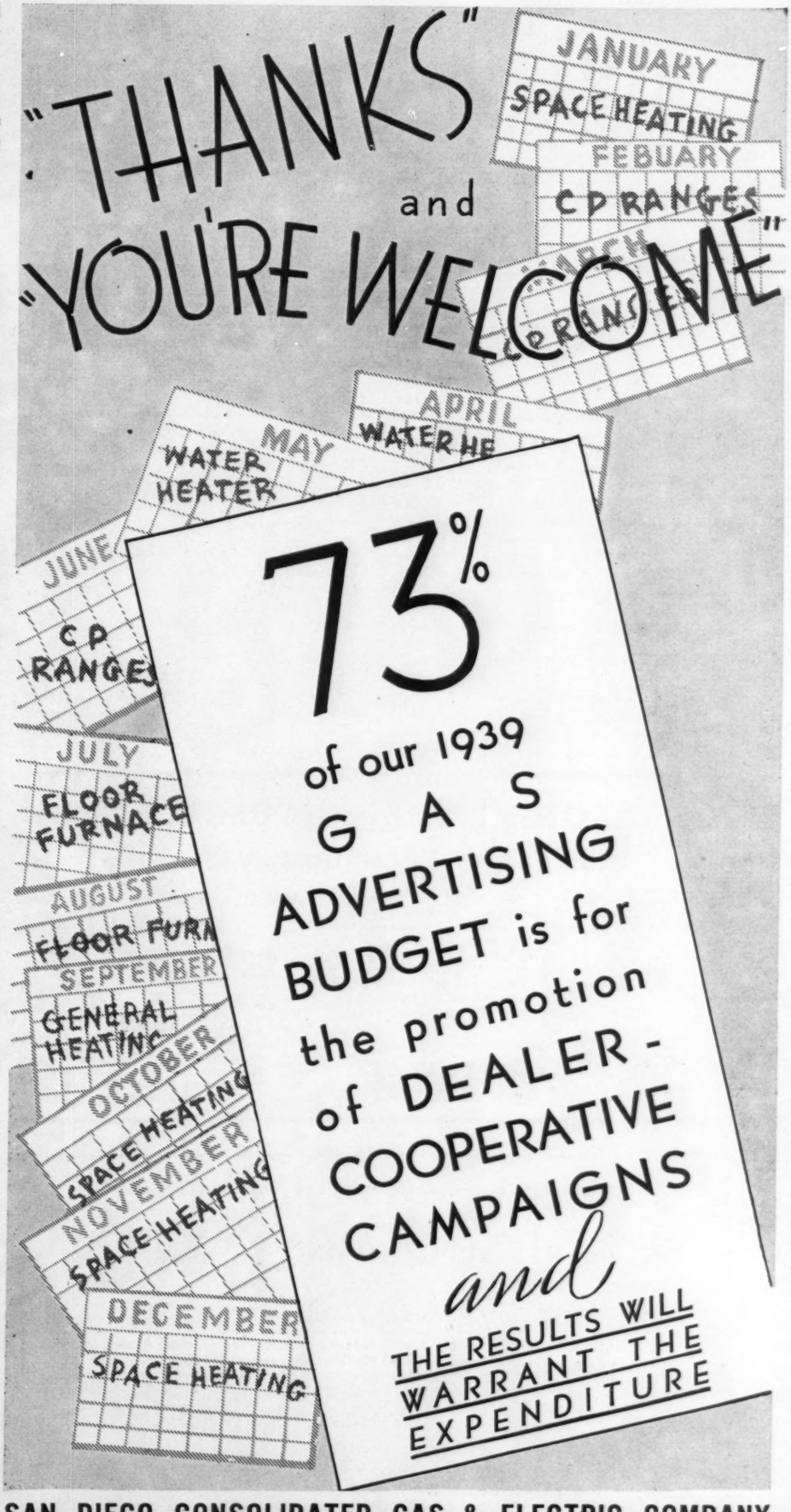
During the last three years, stories devoted entirely to the exploitation of the gas industry and gas appliances have appeared in newspapers having a combined circulation of 943,766,560, and during the same period 787 individual radio scripts have been given on the air, all tending to demonstrate the public interest in gas and gas appliances. To these influences, to the widespread advertising and to the increased comprehension of the value of gas "for the four big jobs" is attributed the fact that last year, alone, 1,013,000 women joined the nationwide swing to modern gas ranges!

■ ■

Plumber Dealers Cooperate With Brooklyn Union Co.

The Brooklyn Union Gas Co., Brooklyn, New York, in a recent statement to employes, reported that the past 10 years of cooperation between the company and the master plumbers of Brooklyn and Queens in the merchandising of modern, automatic gas appliances had resulted in sales amounting to $7,810,293.37. These appliances have brought a substantial increase to the company's gas load, and the plumber dealers have benefited in turn through increased installation fees. This program of cooperative selling has been in effect for 10 years, following the separation of the plumbing from the utility business.

Hugh H. Cuthrell, vice president, has estimated that in the next 10 years the master plumbers will double former marks and sell $15,000,000 worth of appliances.



CURRENT Reading

Recovery of Sulfur from Fuel Gases—Alfred R. Powell. *Industrial and Engineering Chemistry*, July 1939, pp. 789-796. History of recent developments in Europe and the U. S. are given. Processes are described for recovery as elemental sulfur and as hydrogen sulfide, also final processing and uses for recovered sulfur. Flow diagrams: Thylox process; single-stage and two-stage phenolate process; "purification type" of contact acid plant.

The Physiological Effects of Toxic Gases and Vapours—T. McClurkin, *Jour. Inst. Petr.*, June 1939, pp. 382-391. In the first part of this paper the physiological effects of gases and vapors which are likely to be met with in the petroleum industry are considered. The second part deals with a group of other toxic gases and vapors.

A Liquid-Flow Regulator and Its Application to a Constant-Rate Gas Sampler—J. R. C. Duke. *Jour. Soc. Chem. Ind.*, Trans., June 1939, pp. 231,232. A liquid-flow regulator has been devised which operates on the principle of the Edwards gas-regulating bottle, the place of gas in the latter being taken by water or other liquid. Small errors, due to displacement of mercury, have been eliminated by the insertion of a glass diaphragm which is permeable to water, but not to mercury. The regulator has been used in the construction of a constant-rate gas sampler.

The Detection of Toxic Gases in Industry—R. B. Vallender. *Jour. Inst. Petr.*, June 1939, pp. 392-409. Author considers industrial gases with regard to their effects on the health of the workers, and deals with the problem of how to determine whether or not an atmosphere is free from dangers of this type.

Application of Electrochemistry to Cathodic Protection—Scott Ewing, National Bureau of Standards, Washington, D. C., and Research Associate, American Gas Association. Address before Petroleum Industry Electrical Association Convention, Houston, Texas, May 3, 1939. *Electrical News*, May 1939, (J. F. Collerain, Secretary, P. O. Box 2412, Houston, Texas). This address deals with the potentials of reproducible electrodes—potentials in concentration cells, standard electrode potentials, reference half-cells for electrochemical measurements, reference half-cells for potential measurements, factors affecting the accuracy of potential measurements in the soil; potential behavior of metals in corrosive solutions—the difference between stable and corroding electrodes, the effect of various factors on the potential of a corroding pipe line; galvanic pipe line currents and cathodic protection—the conditions when a bare pipe line approaches potential equilibrium, changes in potential and current flow which may be produced by cathodic protection. (Ed. Note: Some of the information included in this paper, and related data, as previously written by the author, may be found in the May, 1939, p. 44, and July, 1939, p. 38, issues of *GAS*.

Cooperative Research on Natural Gas—John W. Finch and R. A. Cattell. Paper presented before the Natural Gas Section, American Gas Association, Tulsa, Oklahoma, May 11, 1939.

The Economic Design of Gas Transmission Lines—Sylvain J. Pirson. *Oil Weekly*, July 10, 1939, pp. 22, 24, 26, 28, 30, 32, 34, 36. The accurate and economic design of gas transmission lines is a complex problem, the mathematical solution of which does not appear thus far in the technical literature. This article is an attempt at solving this intricate problem when the lengths of the individual branches of the distribution system are known.

Physical Constants of the Principal Hydrocarbons—Second edition, 1939. Compiled by M. P. Doss, technical and research division, The Texas Co.; 152 pp. cloth; published by The Texas Co., 135 East 42nd St., New York; available only to individuals and organizations interested in hydrocarbon chemistry. Helpful tables prepared for the convenience of laboratory workers and including most of the aliphatic hydrocarbons, naphthelenes, unsaturated ring hydrocarbons, and mononuclear aromatics. Data are accompanied by references permitting comparison with original literature. Published only in a limited edition, with all copies numbered, and distribution restricted.

The Safety of Electrical Apparatus For Use in Inflammable Gases and Vapors—C. B. Platt. *Jour Inst. Petr.*, June 1939, pp. 368-376 This report deals with the design of bells, telephones and lamps which are intrinsically safe for use in atmosphere containing petroleum vapors. The difference between intrinsically safe electrical apparatus and flame-proof enclosures is indicated.

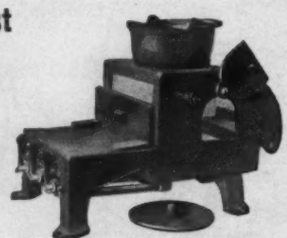
Flame Arrestors—H. H. Raider. *Jour. Inst. Petr.*, June 1939, pp. 377-381. This paper describes the workings of flame arrestors and the way they should be installed, in order to prevent either a flame or an explosion from the outside from entering and igniting a space containing an explosive vapor, and also that an explosion cannot spread between two spaces interconnected by a vapor line.

Calculation of Transfer Area in Heat Exchangers—John Griswold, Assistant professor Chemical Engineering, University of Texas.

A Field Balance for Weighing Pipe to Determine Rate of Corrosion—T. H. Marshall and D. Chads, Chemical Engineering Department, University of Kansas.

JOHNSON'S 118 BENCH FURNACE Does More Jobs Faster at Less Cost

The kind of furnace that does a lot of jobs well! Three direct jet burners give intense heat without blowers or forced draft. Favored by experienced shop men for heating largest coppers, branding irons, tempering, annealing, case hardening and soft metal melting. Note side doors for heating long rods and sweat pipe joints. Refractory firebox lining and detachable baffle plate assure uniform heat. Removable pot holds 22 lbs. of lead. Write today for your FREE catalogue!



Note the rugged design built for hard use and years of trouble-free service. The cost is surprisingly small!

JOHNSON GAS APPLIANCE CO. Cedar Rapids IOWA

GAS—810 South Spring Street, Los Angeles, California

Yes! SEND ME GAS for ☐ 3 Years at $2.00

SUBSCRIPTION RATES: United States, Canada, Mexico and Central American countries (in advance), three years $2.00; all other countries, $3.00 per year.

Name.....Position.....

Company.....

Address.....

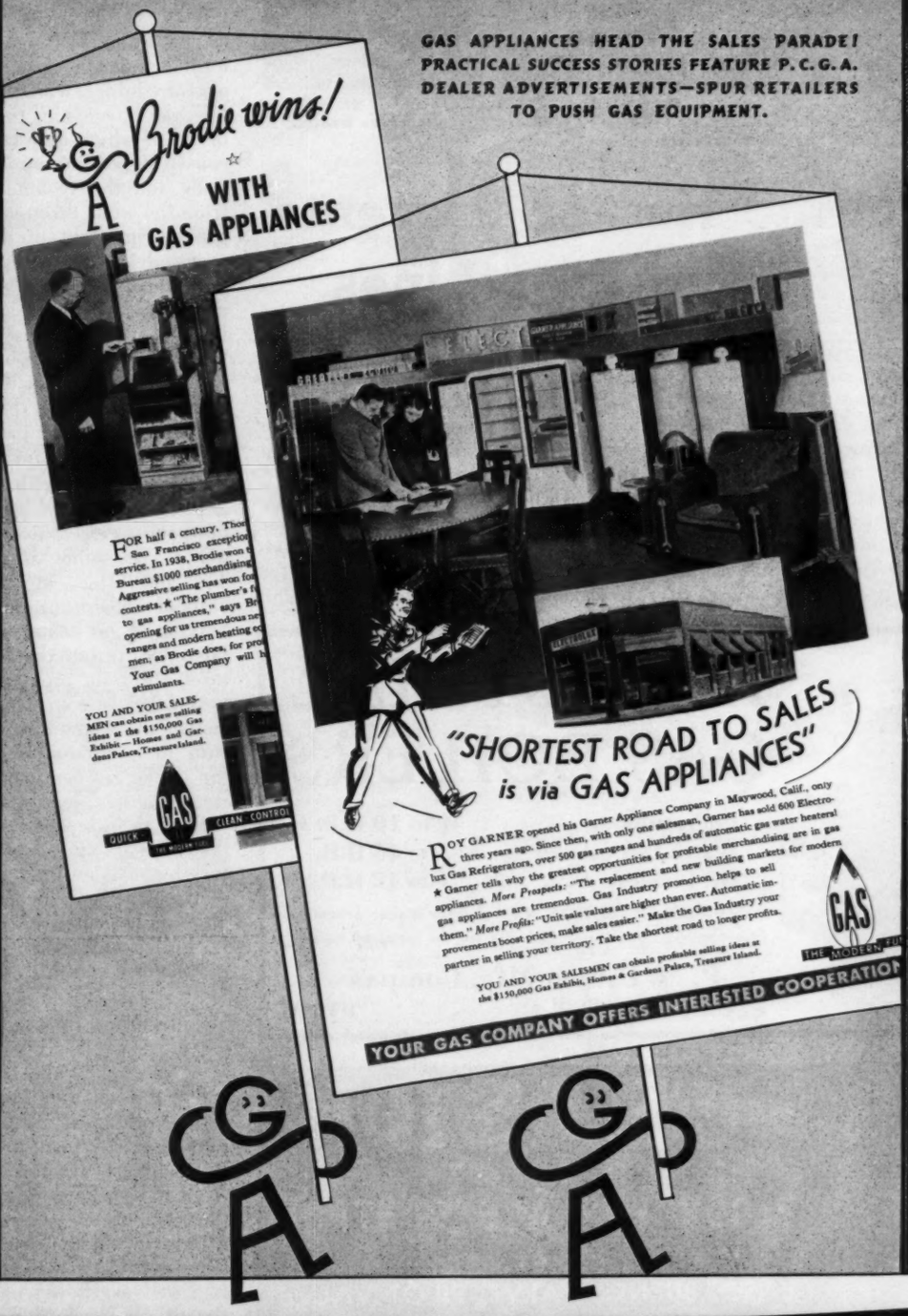
City.....State.....

☐ Check enclosed ☐ Send bill

P.C.G.A. PREVIEW

COOPERATIVE LOAD-BUILDING

GAS APPLIANCES HEAD THE SALES PARADE! PRACTICAL SUCCESS STORIES FEATURE P.C.G.A. DEALER ADVERTISEMENTS—SPUR RETAILERS TO PUSH GAS EQUIPMENT.


Brodie wins!
WITH GAS APPLIANCES
"SHORTEST ROAD TO SALES is via GAS APPLIANCES"
YOUR GAS COMPANY OFFERS INTERESTED COOPERATION

P. C. G. A.
H. L. Farrar, President
Clifford Johnstone, Managing Dir.

SEPTEMBER 1939

COMMITTEE
A. C. Joy, P. G. & E.
J. S. Spaulding, So. Calif. Gas Co.

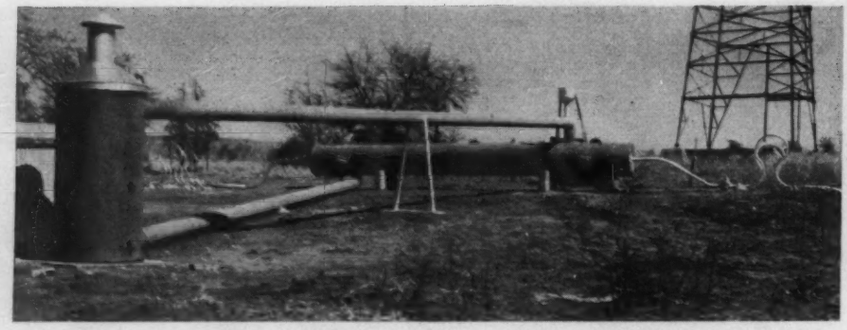


FIG. 1. Gas heater used in Cement (Okla.) field to raise the temperature above freezing to obtain more accurate measurement.

Automatic Heater Prevents Freezing in Pipe Lines

THE natural gas produced from the deeply buried sands in the Cement field of Caddo County, Okla., contains small quantities of easily condensable fractions, such as propane, butane and heavier hydrocarbons, together with quantities of hydrates which cause formation of icy obstructions in restricted areas, such as orifice plates. Each producing and pipe line company in this area has developed different types of pipe line heaters, ranging from direct application of heat with a gas flame to more or less elaborate systems employing thermostats and circulating water without pumps, each different unit operating with varying success.

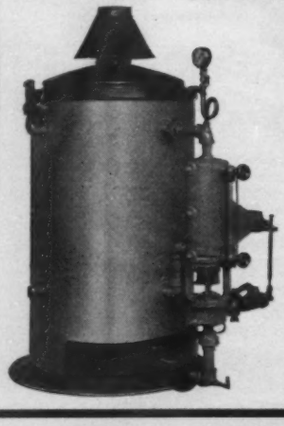
The Oklahoma Natural Gas Co. recently installed an automatic pipe line heating unit, combined with flow controllers, which has been operating for several months. The object of this unit is to raise the temperature of the gas a sufficient amount that ice will not form in the measuring system. The apparatus was installed not far distant from a connection in that company's recently constructed pipe line from the Cement field to a main trunk line leading northward, and operates as a thermo-syphon unit which requires no pumps for the circulation of water.

The water heating element in this unit included a vertical, tubular, low-pressure boiler, which is equipped with five gas burners in the base, any one or all of which may be used simultaneously, depending upon weather conditions and the volume of gas flowing from the wells through the heater. The gas heating part of the apparatus is a cylindrical vessel, approximately 15 ft. in length, set horizontally on concrete piers to raise it above the ground level. The interior of the vessel contains a number of ½-in. tubes attached to headers at each end, and forming a three-pass flow by the use of return bends, to obtain the greatest amount of exchanger surface for heating the gas.

As the heater with the gas burners is placed slightly down-grade from the horizontal vessel, flow of water from one to the other is obtained easily. Two 6-in. lines of pipe connect the vertical water heating element with the horizontal gas heater, both being insulated to prevent the loss of temperature. The 6-in. pipe which carries the hot water is connected to the upper end of the water heating element, and runs in a horizontal direction to the top of the gas heating vessel. The cold water line is connected to the lower side of the gas heating vessel, and to the base of the water-heating unit, forming a complete circuit for travel of the water, which moves only when alternately heated in the vertical tubular boiler, and cooled in the horizontal gas heating vessel.

Swedge Introduces Water

At the top of the horizontal vessel, where the hot water line is connected, a large swedge is installed with the top part open to form a funnel for the introduction of water into the system. A small overflow pipe is connected to the base of the swedge, leading to a drum sunk in the ground to impound and save water which, when expanding, will overflow from the swedge in the circulating line. Water so accumulated in the drum is removed when required for replacing that which may have been lost from the system through evaporation. A general view of the water heater, gas heater and connecting water lines is shown in Fig. 1.

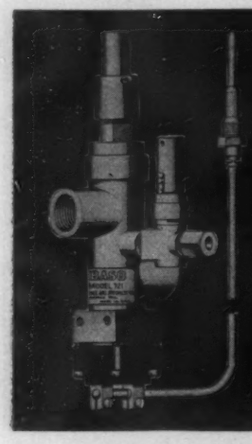


INDUSTRIAL GAS BOILERS

Plain tubular . . . . . ¾ to 10 H.P.
Water Leg tubular . . 5 to 45 H.P.
HE Flueless . . . . . 1 to 18 H.P.

ASME Code for 100 lbs. S.W.P., also for higher pressures.
Non-electric Low Water Cut-offs for all types of boilers.

P. M. Lattner Mfg. Company
CEDAR RAPIDS IOWA



MODEL BASO 721
ONE UNIT
FLOOR FURNACE CONTROL
COMBINES
BASO, BURNER VALVE, PILOT VALVE
PROVIDES COMPLETE SAFETY
FOR ADDITIONAL INFORMATION WRITE:
MILWAUKEE GAS SPECIALTY CO.
MILWAUKEE - WISCONSIN

U. S. Commerce Department Issues Industrial Market Data Book

A NEW guidebook for American businessmen, the *Industrial Market Data Handbook*, containing vital information for establishing new sales territories, production quotas and marketing campaigns, is now available for distribution, according to a recent announcement of Harry L. Hopkins, Secretary of Commerce.

The handbook contains figures on industrial production, employment, value of products, cost of material, fuel and power, and output per wage earner for each of the 3070 counties in the United States, and similar data for every city of more than 10,000 population. The figures in the handbook pertain to 1935, the latest year in which information in this form is available.

Included in the handbook is a tabulation of the county locations of 169,111 manufacturing plants by kinds of industry. Parallel tables cover the mining industry with a county location table for each of the 23,000 mines by type of mine.

Operation summaries showing the number of firms engaged, cost of material, fuel and power, value of products and the number of wage earners are included on a national basis for each of the 280 industries covered in the handbook.

The publication also contains information dealing with channels of distribution and manufacturing operation costs, as well as a key table on wholesale operation in a number of heavy industries.

The handbook (Domestic Commerce Series No. 107) was prepared as a cooperative study by the Bureau of Foreign and Domestic Commerce, the Census Bureau, and the Bureau of Mines. Copies may be obtained by placing orders with the Superintendent of Documents, Washington, D. C., or with any district office of the Bureau of Foreign and Domestic Commerce. The price is $2.50 per copy.

■ ■

A.G.A. Statistical Folder Lists Gas Usages at New York Fair

To help in building non-residential gas loads and equipment sales, the Publicity Committee, Industrial Gas Section, American Gas Association, has produced for general use by all members of the Association an eight-page, two-color, statistical analysis of the role played by gas in the operation of the New York World's Fair. The piece gives a complete tabulation of "who uses gas for what," detailing every use of gas by 211 World's Fair exhibitors, concessionaires, and operating units. It also provides a complete breakdown-by-type of the 3249 separate pieces of gas-fired equipment at work in 437 locations on the Fair grounds.

On the cover of the printed folder, a new cartoon character is introduced under the name of H. Andy Gasflame, the Jack-of-all-trades. It is suggested by the A.G.A. that this character — whose bailiwick is exclusively non-residential gas utilization — will be picked up by individual gas companies and equipment manufacturers, and effectively put on the sales job in local literature and advertising. Copies may be obtained for $3 per hundred.

■ ■

Standards Bureau To Examine Buried Corrosion Samples at Test Sites

According to an announcement by Lyman J. Briggs, director, National Bureau of Standards, Washington, D. C., corrosion samples at various burial sites throughout the country will be excavated and examined during the next three months. These examinations will be in charge of Dr. K. H. Logan, chief of the Underground Corrosion Section of the National Bureau of Standards. Those interested in witnessing the excavation of samples in their territory should contact Dr. Logan in Washington, D. C. Among the samples to be examined are the following:

Materials buried in 1922: Armco iron, wrought iron, Bessemer steel, open hearth steel, copper-bearing steel, Duriron, fiber, De-Lavaud cast iron, pit cast iron, lead.

Materials buried in 1924: Lead-coated pipe, galvanized pipe and sheet (three kinds), bitumen-coated pipe (three kinds), and brass attached to lead, brass, or galvanized iron.

Materials buried in 1926: Copper pipe, brass pipe.

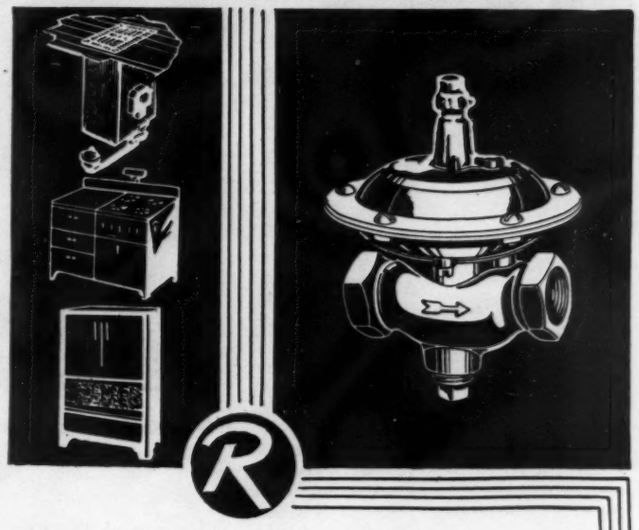
■ ■

Gulf Natural Gas Seeks Permit For Gas Line Near Lockport, La.

The Gulf Natural Gas Co., Lockport, La., has applied for a War Department permit to authorize the laying of a gas pipe line under and across Company Canal subdivision of the Intracoastal Waterway, Mississippi River Atchafalaya River Section, near Lockport.

The line would not exceed 6 in. in diameter at a depth of 15 ft. below mean low Gulf level across the channel, and 3 to 4 ft. below ground surface on the side slopes.

Accurate



★ In the Low Pressure Field, where sensitive regulation pays a premium, REYNOLDS offer extreme accuracy—the ability to keep small volume delivery pressure uniform, even if the line pressure varies. All REYNOLDS Regulators are precision built and delicately balanced for accuracy on low pressure. REYNOLDS Regulators give 100% operating performance—they are rugged, long-lived and sensitive. The many thousands in operation after years of service is the final proof that REYNOLDS Low Pressure Regulators are reliable, economical and safe.

Our Engineering Department is at your service. Write!

BRANCH OFFICES:
422 Dwight Building, Kansas City, Mo.
2nd Unit, Santa Fe Building, Dallas, Texas.

REPRESENTATIVES:
Eastern Appliance Company, Boston, Mass.
Wm. A. Ehlers, 49 S. Clinton Street, East Orange, N. J.

☆

REYNOLDS GAS REGULATOR CO. ★
ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

VENT-A-HOOD . . . sensational new patented kitchen ventilator—NOT A FAN—grease trap and centrifugal exhaust unit removes cooking odors from kitchen before they can invade other parts of the house. Prevents greasy vapors from settling on walls —saves housework. Keeps kitchen cool. Biggest innovation since mechanical refrigeration.

FREE TRIAL Sales Plan

Write for particulars of our FREE Trial Selling Plan. If Vent-A-Hood doesn't prove it will sell for you, there's no obligation.

The VENT-A-HOOD Co.
2808 COMMERCE STREET
DALLAS, Dept. L TEXAS

GIVE THEM "PERFECT HEAT"

BOTH YOU AND YOUR CUSTOMERS PROFIT WITH NEW

FRASER CABINET FURNACE

This NEW Fraser Cabinet Furnace . . . a modern, "stream-lined" unit, finished in Ivory—rich in eye appeal . . . gives correct heat at truly low cost . . . requires a minimum of floor space. Also Fraser Floor Furnaces, Wall Furnaces, Winter Air-Conditioning Systems, Basement Furnaces and Consoles . . . available in many sizes . . . offer the utmost in efficiency and economy. Fraser can exactly fill the heating needs of your customer . . . real satisfaction to them . . . real profits to you.

Manufactured by FRASER FURNACE CO. Stockton, California

Distributed by H. R. BASFORD CO. San Francisco - Los Angeles

FRASER GAS HEATING EQUIPMENT

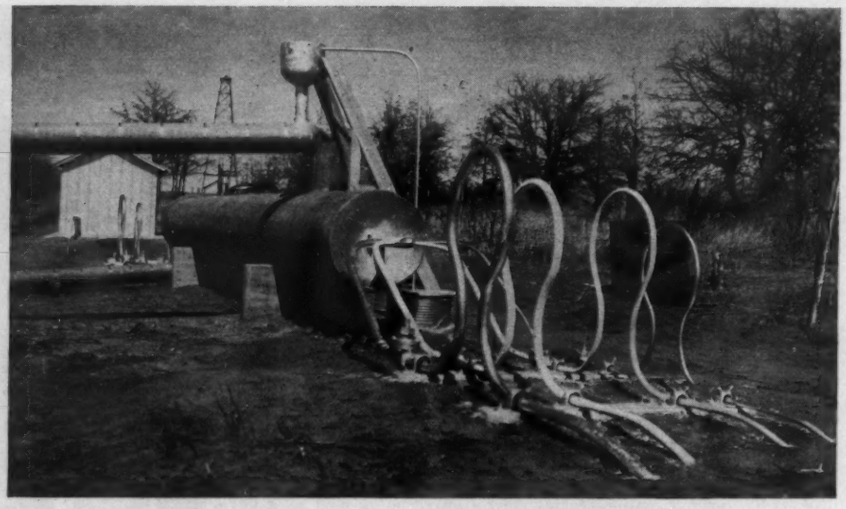


FIG. 2. Heating unit with expansion loops in piping to compensate for contraction and expansion, showing different sized pipes to regulate volume of gas.

Details of the inlet gas piping, water overflow line, etc., are given in Fig. 2.

The gas enters the gas heating vessel through any combination of four different size pipes, ranging from ½-in. to 2-in.; graduated as follows: ½-in., ¾-in., 1½-in., and 2-in. Each of these lines is equipped with high pressure lubricated plug valves, and each line describes a long over-bend, or loop, near the gas heating vessel to compensate for expansion and contraction due to changes in temperature. Concrete piers are installed at each end of these loops, with metal hold-downs to prevent lateral movement of the settings.

Each end of the gas heating vessel is fitted with a 4-in. exterior nipple to which each of the four loops are connected. The 4-in. nipple extends through the head of the vessel to connect to the tube header inside the vessel. "Wrinkle bends" were employed when forming the loops in the pipes to eliminate weakening of the walls.

On the down-stream end of the horizontal gas heating vessel, drips of adequate capacity were buried beneath the surface of the ground to form accumulation chambers for liquids which may condense from the gas, or which may have passed through the gas heating element without having been transformed from liquid to vapors. The drips are blown frequently to prevent overflowing and to maintain, so far as possible, clean system without obstructing foreign material. Two uniform meter runs are installed downstream from the gas heating vessel to obtain accurate measurement of the gas entering the transmission system.

The burners in the water heating unit of this system are connected to a thermostat which controls the amount of fuel required to maintain a predetermined temperature of the water returning to the water heater from the gas heating vessel. Adequate heating has been obtained with this heating system on volumes of gas as great as 12,000,000 standard cu. ft. per 24 hours without the formation of hydrate ice in the orifice plates or other portions of the metering system.

■ ■

Lone Star System Pushes Summer Heating Campaign

Substantial discounts on modern heating equipment including floor furnaces, circulators, gas steam radiators and radiant heaters are being offered customers of the Lone Star Gas System, Dallas, Texas, in its 1939 summer heating campaign. Special advertising is appearing in local newspapers throughout the system for the remainder of the campaign, which closes September 30. The Fort Worth branch has installed a floor furnace display unit against a background of a large book, the pages of which contain a list of the names of satisfied users of gas floor furnaces.

New business managers pushing the campaign are C. K. Patton, Dallas Gas Co.; C. L. Trevitt, Texas Cities Gas Co. and Community Natural Gas Co.; and E. C. Whitcomb, Fort Worth Division.

■ ■

Montana-Dakota Utilities Co. Opens Harvest Sales Drive

The Fall Harvest Sales Campaign, an annual competitive event among the various Northwest divisions of the Montana-Dakota Utilities Co., Minneapolis, is again under way. This year, in addition to the Heskett statue trophy, the manager of the winning division will be given a trip to either the New York World's Fair or the Golden Gate International Exposition.

Since 1932 this Fall sales competition, covering the sale of gas appliances, has been a company feature. Last year the trophy was won by the Great Falls, Mont., division, managed by Harlan Scott.

Don't Dig Up Lawns or Pavements!

INSTALL PIPE WITH A GREENLEE Hydraulic PIPE PUSHER

The Greenlee Pusher will take pipe up to 4-inch and has 6 operating speeds. Pumping the handles sets up pressure within the cylinders, causing the unit to move forward on the steel base. These bases are made in lengths for pushing from 4 to 7 feet with but one setting of the pipe clamp.

It's Faster—Easier—Cheaper

Efficiency in the installation of pipe under lawns, streets, railroads, etc., comes from quickly pushing the pipe in place with the least possible trenching. Not only does it prevent damage, but it avoids interference with traffic and saves considerable time and money on the job.

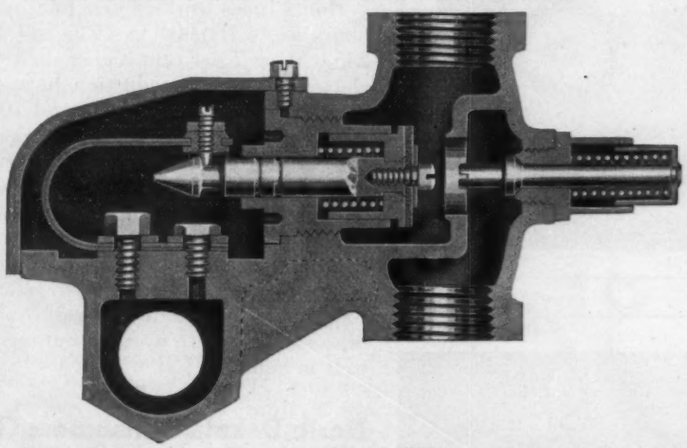
The Greenlee Hydraulic Pusher requires a trench just long enough for the pushing operation; and one man, standing in a comfortable position can send the pipe where wanted, simply by pumping the handles. It is readily portable, easy to set up and simple to operate.

This tool is saving money for a list of users that grows larger each week. It can do that for you, too. Let us tell you about it.

Below: Set up for pushing under a paved street on a National Highway.

GREENLEE TOOL CO., 1700 Columbia Ave., ROCKFORD, ILLINOIS

Positive Protection



Send for Catalog A "Watchman" Descriptive Literature

Truly a "Watchman"!

Kitson's "Watchman" emergency gas shut-off valve (Lovekin Patent) is highly recommended for use on all circulating (manual and automatic conversion) gas water heater systems. A positive acting bi-metal control element "polices" the installation against excessive temperature or thermostat failures. Simple hand re-set feature saves many unnecessary and expensive service calls.

KITSON COMPANY
2409-15 Westmoreland St., Philadelphia, Pa.
Manufacturers of Kitson Safety Devices (Lovekin Patents) for Domestic Water Heaters . . . Quality Brass Goods for Gas, Water and All Plumbing Uses.

Recent Employment Trends In Oil and Gas Fields

FROM a peak in 1929, employment at oil and gas wells and natural gasoline plants declined rapidly, particularly in the depression years, so that by the middle of 1933 hardly half as many wage earners were employed as in 1929. The recovery was rapid in the last half of 1933 and the first half of 1934, slowed down in 1935, but was greatly accelerated in 1936. Though employment increased in 1937, the gain was much smaller than in 1936, and in 1938 there was an actual decline. This general statement is based primarily on data of the Bureau of Labor Statistics for the period 1929-34, on data for 1935 assembled by the Bureau of Mines in cooperation with the Census of Business, and on studies of field employment by the Bureau of Mines for 1936, 1937, and 1938.

The average natural gas marketed comes from wells producing nothing else, generally called "dry" gas wells, or is "casinghead" gas from oil wells. The production of casinghead gas from a well is an incidental operation and the amount of human energy used in connection therewith is not measureable. Therefore, the relatively small amount of labor involved in casinghead gas production is included with that for oil wells.

There are, however, more than 50,000 "dry" gas wells for which it is possible to obtain employment data covering drilling and producing activities of gas companies. The average number of "workers" for the United States for 1935, 1936, and 1937 was 7288, 8360, and 9073, respectively. The number of producing wells increased steadily in this period and marketed production rose substantially, but the largest factor in the gain in number of workers probably was the growth in number of gas wells completed, 1936 being nearly 50 per cent above 1935 and 1937 more than 20 per cent higher than 1936. As with employment at oil wells, there is a possibility that some of the 2780 salaried employes reported separately in 1935 were included in the "workers" of 1936 and 1937.

In general, there is one wage earner to every three oil wells and to every six gas wells. This variation reflects the essential difference in operating methods for the two types of wells, which is that oil wells, after a short period of natural flow, have to be pumped, but gas wells flow from the time they are drilled until they are abandoned.

Part-time work is more important in gas than in oil, primarily because most of the employment is in the eastern states in which small marginal properties abound. In 1936 there were 3093 part-time workers (37 per cent of the total); in 1937 the number increased to 3310 (36 per cent of the total).

Wage earners at gas wells work considerably more hours per week than those at oil wells, primarily because most such workers are in the eastern fields where economic considerations require relatively larger expenditures of human energy. Assuming continuous work throughout the year, the average hours per week for full-time workers declined from 50.2 in 1936 to 49.6 in 1937; the hours per year of part-time workers declined from 784 in 1936 to 722 in 1937.

Hours times workers give total manhours as 16,160,000 in 1936 and 17,245,000, or 7 per cent higher, in 1937. Data on dry-gas production have not yet been compiled for 1936 and 1937, but as the relative increase in marketed production of 1937 over 1936 was about double the gain in total manhours (6 per cent), it is virtually a certainty that the average labor productivity registered a substantial gain. This reflects the increase in relative importance of the fields west of the Mississippi, where average output per well is high.

■ ■

North Dakota Consumers Gas Co. Gets Pipe Line Permit

After two earlier hearings, the Board of Railroad and Warehouse Commissioners, meeting in Bismarck, N. D., August 12, granted to the North Dakota Consumers Gas Co. authority to construct and operate a 12-in. natural gas pipe line from Mandan east to Fargo and north to Grand Forks, all in North Dakota. The company expects to later extend its line to Crookston, Minn.

The North Dakota company is said to have a contract with the Montana-Dakota Utilities Co. to purchase gas from the latter company, 50 per cent of which may be paid in cash and the other half in certificates of indebtedness. This plan has been approved.

MONO-CAST DOUBLEX SIMPLEX PIPE

"Giving remarkable service" is how gas company officials describe the performance of this Mono-Cast Doublex Simplex Pipe Line leading into plant of one of the largest public service companies in the Midwest. More than 5,000,000 feet of Mono-Cast Doublex Simplex Pipe are giving completely satisfactory service in pipe lines conveying gas, gasoline, oil, water, sewage, industrial wastes, etc., throughout the United States and in foreign countries. Write for literature.

AMERICAN CAST IRON PIPE CO.
BIRMINGHAM, ALA.
Dallas Houston El Paso Pittsburgh Kansas City Chicago Minneapolis New York City Cleveland Los Angeles San Francisco

Simplified Control
FOR GAS HEATERS
NO HUM - NO STICKING - NO CHATTER

A SIMPLE, positive-acting thermostatic disc operates Klixon Gas Valves. Therefore you have no solenoid troubles. No humming. No sticking. And a similar disc operates the Klixon Room Thermostats, making them vibration-proof, non-radio-interfering, sensitive, snap-acting.

Use these Klixon Gas Valves and Thermostats for more satisfactory control. Valves from ⅜" to 1¼" I. P. S. through 1000 cu. ft. Thermostats, in several attractive finishes. Sold separately or in sets. Line or low voltage. Write.

KLIXON
SPENCER THERMOSTAT CO.
ATTLEBORO, MASSACHUSETTS, U. S. A.

THREE ESSENTIALS for LASTING PIPE PROTECTION

most ferrous pipe must be **COATED** TO RESIST CORROSION

More than 25 years' experience shows that most types of ferrous pipes break down when exposed to the destructive action of soil corrosion. Such pipes give low-cost service only when protected with a corrosion-resistant coating.

coatings must be **WRAPPED** FOR REINFORCEMENT

The toughest coating can be seriously damaged by soil stresses and earth loads. To keep maintenance from becoming a problem, the coating must be shielded or reinforced with a durable wrapping.

the best wrapping is **ASBESTOS** PIPE-LINE FELTS

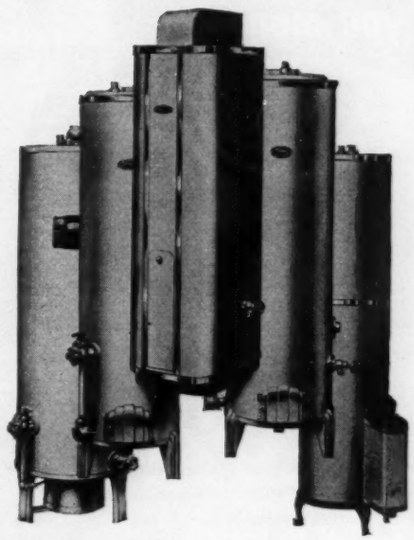
Made of asbestos fibers—inorganic and non-tubular—J-M Pipe-Line Felt cannot support capillary action. Strong and durable, it effectively prevents distortion and abrasion of coatings. Its high corrosion resistance assures efficient protection for coatings—minimum upkeep costs.

• • •

YOU'LL BE INTERESTED in learning how J-M Asbestos Pipe-Line Felts add years to the life of pipe under any service conditions. For details, write Johns-Manville, 22 E. 40th St., New York, N.Y.

JOHNS-MANVILLE JM PRODUCT
ASBESTOS PIPE-LINE FELTS

FOR YOUR FALL CAMPAIGN



THE WELSBACH LINE OF

HOTZONE Welsbach

GAS WATER HEATERS

• Now is the opportune time to start an aggressive Hotzone Gas Water Heater Campaign. Vacations are over—everyone home with their minds on home comforts and conveniences.

• When you sell self-acting Hotzone Water Heaters, you can supply every kind of demand for automatic hot water service . . . satisfactorily . . . permanently increasing your domestic load. Every Hotzone Water Heater, Storage and Conversion, has the famous WELSBACH luminous flame burner with 100% safety shut-off . . . silent operation . . . gives complete trouble-free service.

Gas Industries Building, New York World's Fair 1939

Homes and Gardens Building, Golden Gate Exposition 1939

WELSBACH COMPANY
Gloucester City, N. J.
Branches in Chicago and San Francisco

Its resistance to corrosion saves you money

ANACONDA

COPPER TUBE
for small mains and services

Also economically ideal for Butane-Propane installations, hot water distribution lines and hot water heating lines. 3922

ANACONDA

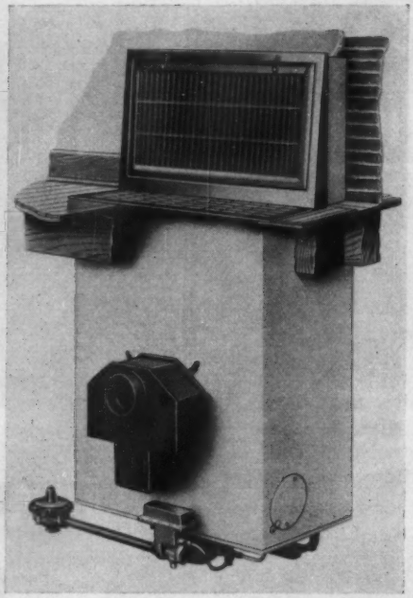
THE AMERICAN BRASS COMPANY
WATERBURY • CONNECTICUT
Subsidiary of Anaconda Copper Mining Company

Those who make an art of living depend on this world famed hotel as the very embodiment of gracious service, true refinement and dignified hospitality.

Under the Same Management as
The Gotham NEW YORK CITY
The Drake CHICAGO
The Evanshire EVANSTON, ILL.
The Town House LOS ANGELES
A. S. Kirkeby, Managing Director

The Blackstone
MICHIGAN AVENUE · CHICAGO

MODERN *Products*



Wall Register Furnace

Pacific Gas Radiator Co., Los Angeles, Calif.
Model: No. A-26.
Description: Complete, independent gravity-type gas-fired warm air furnace for installation in wall and floor. Separate cold air grille encloses furnace from view. Easily removable. Supplies instantaneous circulating warmth for continuous or intermittent heating. Made in cast iron or fabricated steel. Heating element of heavy, rust-resisting steel construction. Combustion and radiation chambers welded together as one complete, gas-sealed, leakproof unit. Combustion chamber sides and top are free from flame impingement, preventing overheating. Multi-tubular type burner. No adjustments required. Downdraft diverter. Pilot with separate control valve. Low pressure regulator maintains constant pressure at burner. Automatically controlled safety pilot. In addition to this single wall register furnace, there is available a floor furnace and a dual wall furnace, the style of installation being the only practical difference.

■ ■

House Heater

The Pittsburg Water Heater Corp., Pittsburgh, Pa.
Description: This heater has new and improved silent, aerated, speed burner; nonclogging raised drilled port, single casting burner and bunsen. Quick acting adjustable thermostat prevents excessive water temperature rises and will shut off gas at desired settings. Complete shut-off safety pilot. The 1/10-hp. motor is silent and the circulator eliminates "water hammer." Expansion tank eliminates "growling." In cold sections, this furnace is designed to work as an auxiliary to coal furnaces, with a solenoid valve to stabilize usual furnace fluctuations. Adaptable to any size rating up to 150,000 B.t.u. input. Due to small amount of water needed, the actual gas consumed is converted into available heat almost instantly. Circulator will give complete cycle of water every three minutes in average installation.

■ ■

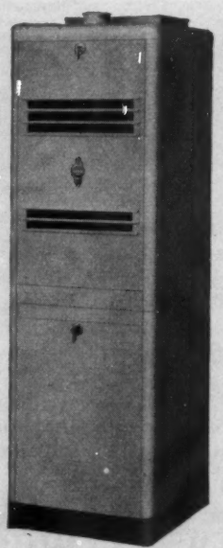
Mercury Pressure Gage

Connelly Iron Sponge and Governor Co., Chicago, Ill.
Model: Mercury Pressure Gage.
Description: The body of the gage is of cast semi-steel. For the tube, an unbreakable glass substitute is used, threaded directly into the casting. This feature is said to eliminate glands or packing. Wide-angle visibility for reading on the black-etched aluminum scale is provided. This scale is graduated from 0 to 3½ lbs. on one side and 0 to 56 oz. on the other.

The manufacturers claim that the compact design and durability of the new gage adapt it to accurate, rapid pressure determination under the most exacting conditions. Connelly has issued a new illustrated bulletin fully describing this new mercury gage. A copy may be obtained by writing the manufacturers direct. Ask for Bulletin No. 401-B2.

■ ■

Forced Air Unit



Payne Furnace & Supply Co., Beverly Hills, Calif.
Model: "The New Fau." A.G.A. approved for natural or manufactured gas. Designed for L.P.G. use.
Description: This new forced air unit has been designed for homes without basements. It can be installed in kitchen, closet or service porch. Equipped with glass wool, replacement type filters to remove dust, pollen and other impurities from the air. Improved heating element increases heating efficiency. Large blower delivers air at slower speed with quieter operation, with blower and motor mounted on resilient rubber blocks. Assembled in two sections, and available in four sizes, B.t.u. input ratings from 60,000 to 160,000.

PROTECTS GAS USERS

"CALODORANT" gives a swift warning against leak danger.

CALODORANT gas odorizing agent has a distinctive and penetrating odor that is generally associated with manufactured gas.

For over eight years leading gas companies have found it to be a vigilant detector of dangerous and costly leaks. Immediately upon the addition of CALODORANT to gas it gives warning of leaks in distributing systems and household appliances . . . a warning that may prevent loss of life and property. It adds no odor to burning gas. It is non-corrosive . . . non-injurious to equipment or users. CALODORANT will remain completely vaporized during long periods of transmission and the odorizing power remains unimpaired.

CALODORANT

REG. U. S. PAT. OFF.

GAS ODORIZING AGENT

AVAILABLE IN TANK CARS AND IRON BARRELS

Address Inquiries to

STANDARD OIL COMPANY OF CALIFORNIA

225 Bush Street, San Francisco, Calif. 30 Rockefeller Plaza, New York, N. Y.

You'll Be the Gainer with "CLEVELANDS" On Your Trenching Jobs

WATCH YOUR COSTS GO DOWN

Because in "Clevelands" you have equipment that exactly fits your work, whether the trench to be dug is long main line through tough soil and difficult terrain or distribution trench in the close confined areas of city and suburb. Here is equipment that meets exactly every requirement. Because it is compact and streamlined for light weight and because it is rugged and dependable and supreme in construction it is the kind of equipment you need to get the pipe in the ground quickly and at lowest cost.

Hair-trigger, truck and trailer mobility make real savings available on more jobs — anywhere in your system. Why not put "Clevelands" to work immediately and watch your trenching costs go down to rock bottom. Write for detailed information today.

Illustrated below, an important "Cleveland" feature: Truck speed transportation on special trailer. Machines load and unload approximately 15 minutes.

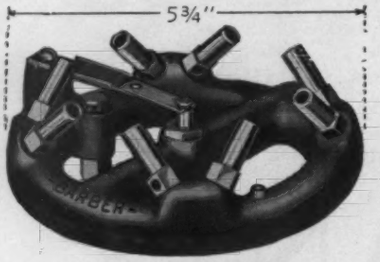
THE CLEVELAND TRENCHER COMPANY

"Pioneer of the Small Trencher"

20100 ST. CLAIR AVENUE CLEVELAND, OHIO

"CLEVELANDS" *Save More* — Because they *Do More*

For BUTANE Gas
You Can Rely On
BARBER
Appliance
BURNERS



No. S. P.-15 Barber Burner
with Safety Pilot

Any gas-burning appliance can be equipped with a Barber Burner with special drilled jets to meet the requirements of Butane Gas. Servicing and backfiring are eliminated. There's a proper, reliable Barber unit for every size and type of appliance — and Barber means top efficiency. Write for complete literature, prices and discounts on the Barber line of Conversion Burners, Appliance Burners, Controls and Regulators.

The Barber Gas Burner Co.
3704 Superior Avenue Cleveland, Ohio

WANTED
Sales Engineers

Well-established liquefied petroleum gas marketer desires experienced industrial gas sales engineers. Give complete information on training and experience.

Address Box A-1, GAS
810 South Spring St.
Los Angeles, California

GEORGE A. BURRELL
Petroleum and Gas Engineer
Design—Construction—Reports
■
Suite 1909
20 Pine Street
New York City
1936-42 5th Avenue
Pittsburgh, Pa.

ROBERT J. KUHN
Consulting Engineer
CATHODIC PROTECTION
Transmission Lines — City Networks
Electrolysis — Corrosion Surveys
Nationwide Service
1644 Canal Bank Bldg. New Orleans, La.

ABOVE: Some of the new apartment buildings constructed for United States naval officers at Annapolis, Maryland. LEFT: One of the apartment kitchens, equipped by the government with an Oriole CP gas range.

CP Ranges Bring Comfort To U. S. Naval Officers

AN order for 84 Oriole CP gas ranges by the United States Government has recently been placed, and their installation in the newly constructed apartment quarters for naval officers at Annapolis, Md., is proceeding rapidly. This constitutes one of the largest orders ever entered by the Government and was decided upon only after exhaustive tests and comparisons between gas and electric appliances, with the greater serviceability of gas winning the verdict.

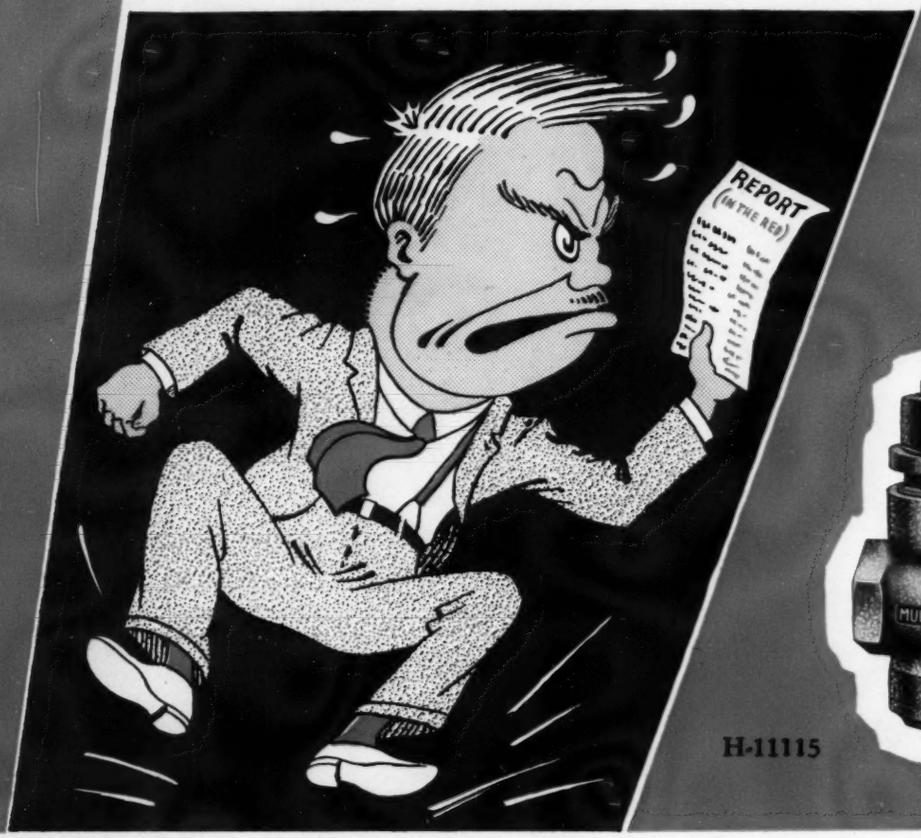
It is said that for many years the administrative staff of the Academy has had a housing problem for the officers, there being but a limited number of residences on the grounds. Last year money was appropriated for a group of 14 apartment buildings, these to be constructed on and adjacent to the Academy golf grounds. In accordance with naval practice, these buildings were designed to be plain but substantial, and the utmost care was used by the architects and engineers to provide the most modern of conveniences, with stress laid upon the durability and convenience of all mechanical equipment. Especially was this true in the kitchens.

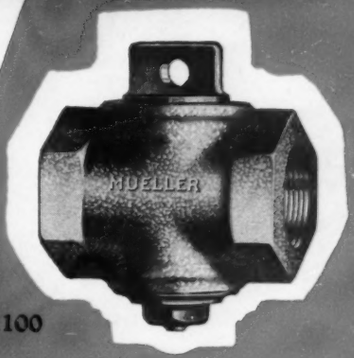
As the Academy generates its own electric current, the use of electric ranges was given preference in the original study, but representatives of the Consolidated Gas, Electric Light and Power Co., of Baltimore, which serves the Academy with gas, and gas range manufacturers, demonstrated that CP gas ranges not only have the automatic advantages claimed for electric ranges but have greater speed, convenience and flexibility, as well as greater economy.

One of the ranges submitted for test was a CP Oriole gas range, made by the Standard Gas Equipment Corp., of Baltimore. With this range, representatives of their engineering department demonstrated the automatic lighting of top, oven and broiler burners, automatic oven heat control, the "thousand heats" of the aluminum speed-simmer burners, the high speed with which oven and broiler are heated by new-type burners, the low oven temperatures made possible by this burner for low temperature roasting, automatic control of oven temperature, the ease of operation and cleaning of the range, and heat-conserving feature of very thorough insulation.

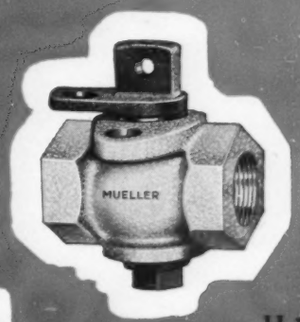
After a thorough study, the Government officials ordered 84 Oriole No. 4401-1 CP gas ranges. As Monel metal had been specified for kitchen sinks, because of its long life, ease of cleaning, appearance and other advantages, the cooking tops of every one of the ranges were made of this material.

DO UPKEEP REPORTS "GET YOUR GOAT"?

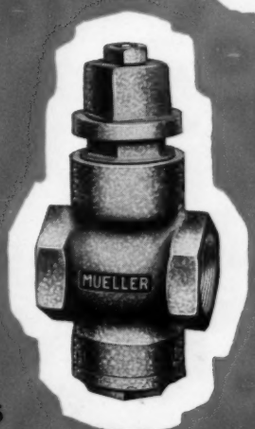




H-11100



H-11102



H-11115

MUELLER IRON BODY GAS STOPS

Many gas men are turning to Mueller Gas Stops exclusively because they have found these stops so durable and a means of reducing repairs and replacements. This is not just a "happen-so"—it is the outgrowth of painstaking engineering and designing plus the many priceless years of experience in making stops of all kinds.

Mueller Iron Body Stops are made of the very best materials produced in our own foundries under strict laboratory control. The design of each stop has been proven by many years of actual service conditions, and precision manufacture by skillfully trained workmen on special machines assure gas stops that pass the most critical inspection and tests. We have a complete line of Gas Stops answering practically any requirement. If your problem is a special one, a line to us will bring you full information.

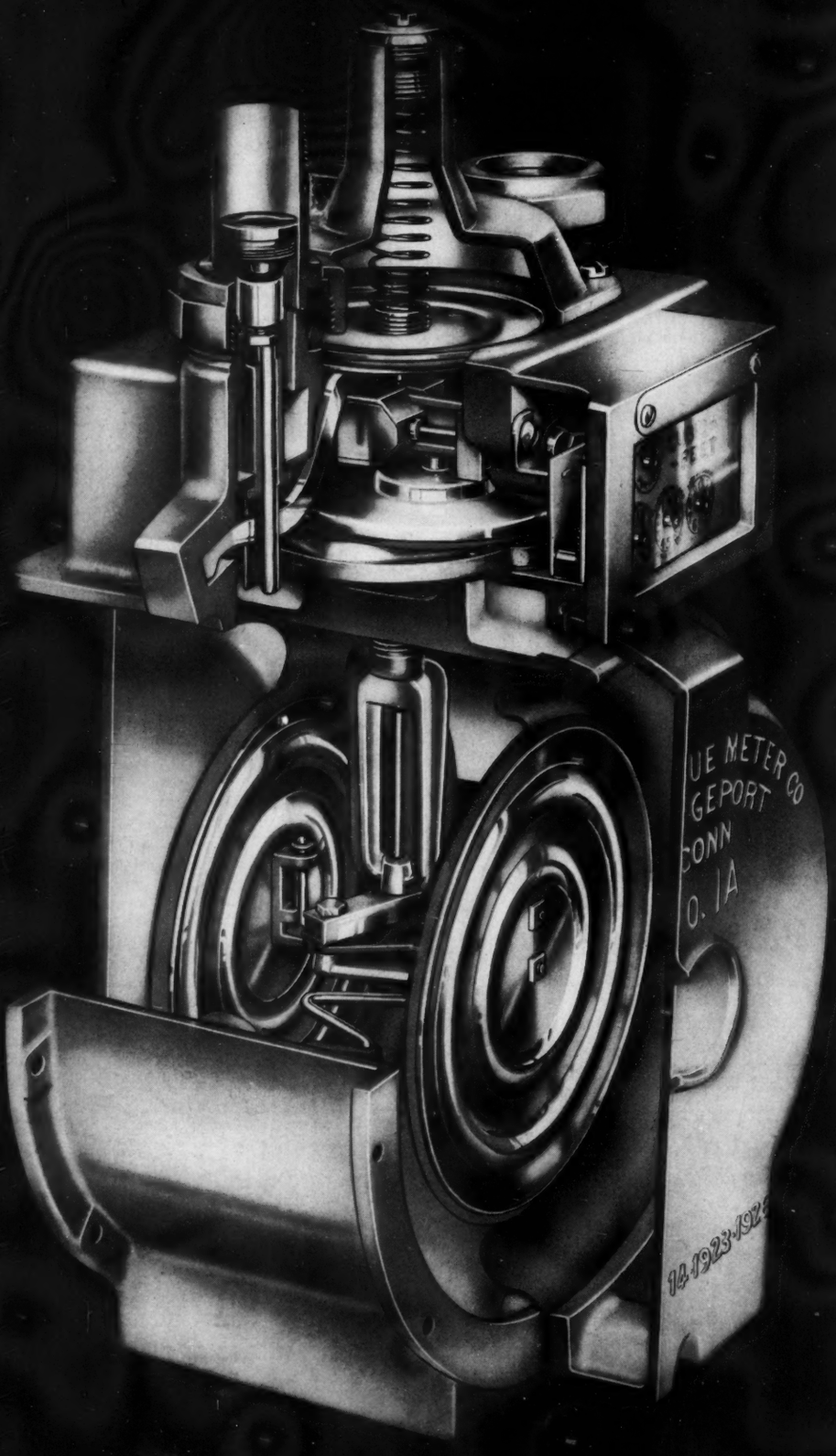
MUELLER CO.

NEW YORK, N. Y.
SARNIA, ONTARIO

DECATUR, ILLINOIS

LOS ANGELES, CAL.
CHATTANOOGA, TENN.

Sprague Leads Again



Here it is!!

The latest achievement in Gas Measurement and Control . . . a combination Meter and Regulator. Write for particulars.

THE SPRAGUE METER CO., BRIDGEPORT, CONN.